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BUREAU OF HYGIENE AND TROPICAL DISEASES

TROPICAL DISEASES BULLETIN

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SUMMARY OF RECENT ABSTRACTS *

VIII. TYPHUS GROUP OF FEVERS †

General

Lewthwaite (p. 101) has written a short account of the typhus group of fevers.

Le Gac *et al.* (p. 295) tested various groups of people in French Equatorial Africa with antigens of the chief rickettsial fevers, for cutaneous hypersensitivity. In the remote, forest-dwelling pygmies the positive results were much less numerous than in the savanna country. The low figures in the forest people reflect the scarcity of vectors of the fevers in those districts.

Weyer and Peters (p. 297) describe the appearance of various rickettsiae on electron microscopy, and the techniques used. Wyatt and Cohen (p. 209) have studied the nucleic acids of various rickettsiae.

Giroud *et al.* (p. 297) describe the intradermal hypersensitivity test for rickettsial fevers which was introduced in 1938. It is comparable to the tuberculin test, and the authors claim that the results of their experiments confirm the existence in Africa of all the 5 major rickettsioses. If properly carried out these tests have an absolute value in providing an index of the incidence of each type of rickettsial fever.

Giroud and Gaillard (p. 396) claim that the rickettsiae which affect man can be differentiated into various groups by inoculation into laboratory animals and by yolk-sac cultivation. Details should be sought in the original. The same authors (p. 618) describe the development of rickettsiae in the cells of the reticulo-endothelial system. Noury (p. 397) found that after intraperitoneal inoculation of rickettsiae of murine typhus into guinea-pigs, spread took place to various organs within 10 minutes, but that with rickettsiae of epidemic typhus such spread was slow (3–4 days). With rickettsiae of boutonneuse fever the period varied.

The rickettsiostatic action of para-aminobenzoic acid on agar-slope tissue cultures can be neutralized by relatively small amounts of para-hydroxybenzoic acid (Takemori and Kitaoka, p. 397).

* The information from which this series of summaries has been compiled is given in the abstracts which have appeared in the *Tropical Diseases Bulletin*, 1953, v. 50. References to the abstracts are given under the names of the authors quoted, and the pages on which the abstracts are printed.

† For previous articles on typhus group of fevers in this series see the October issues of the *Tropical Diseases Bulletin* each year since 1939.

Proteus OX19 type: Vectors louse and flea

Brill's disease is usually regarded as a late-relapsing form of epidemic typhus after an attack which may have occurred many years before. Von Bormann (p. 295) has investigated the evidence on which this theory is based, and disputes its validity. Most of the cases have been reported from the United States, in Jews who immigrated there from typhus areas in Europe, and to the author the evidence suggests that the patients had been recently infected, probably from new immigrants, but that the disease was mild as a result of residual but partial immunity resulting from the original attacks.

Djourichitch (p. 919) describes the epidemic of typhus which occurred in Yugoslav refugees in 1942; these people were in a bad state, but the mortality was surprisingly low compared with the mortality in outbreaks in the war of 1914–18.

Evans and Smith (p. 398) report studies on the intrinsic rate of natural increase of the human louse.

Kryński and Radkowiak (p. 206) describe the Weigl method of cultivating *Rickettsia prowazeki* in lice. Weyer (p. 499) has succeeded in cultivating *R. prowazeki* and *R. mooseri* in tissue cultures of infected louse stomachs to which small fragments of certain rabbit organs were added. The rickettsiae remained virulent for periods up to 16 days. After prolonged culture they ceased to multiply inside the cells but continued to do so extracellularly, and they behaved like *R. quintana* though still virulent for mice. Yolk-sac cultivation, however, has deprived this work of much of its practical importance.

Ciaccio (p. 397) shows that infection of certain fish and amphibia with *R. prowazeki* or *R. mooseri* appears to be possible.

Chang *et al.* (p. 613) describe ESS, erythrocyte-sensitizing substances, obtained from cultures of *R. prowazeki* or *R. mooseri*, which render erythrocytes agglutinable by specific antisera. Such sensitized cells may be used to detect antibodies. Epidemic and murine typhus sera gave the same reactions. The test is specific and simple, and positive results can be obtained easily, but it does not regularly become positive in infected animals. In a series of investigations Rodrigues and Travassos (p. 206) were not always successful in differentiating between murine and epidemic typhus by means of the Bengtson complement-fixation test with murine or epidemic antigens. Montoya (p. 22) has observed that the sera of guinea-pigs kept in the houses of people in Colombia sometimes show positive results with complement-fixation tests for epidemic or murine typhus. The implications of this finding are being investigated.

Parotitis of various types was observed by Tecce (p. 298) during the outbreak of typhus in Naples in 1943–44.

Van Bommel (p. 205) gives an account of the precautions taken by the United States authorities in South Korea to control typhus in the civil population; they included the use of insecticides, and of typhus vaccine. Typhus is still important in Mexico, where 57 outbreaks were reported in 1951. Ortiz Mariotte (p. 696) describes the campaigns instituted for mass use of DDT in communities in which louse infestation is high. In Guatemala, where the incidence of typhus was high in pre-DDT days, the recent campaigns have included immunization with a modified Cox vaccine, and the use of 10 per cent. DDT powder (Cabrera *et al.*, p. 697).

Murine typhus has declined in recent years in the United States. Quinby and Schubert (p. 614) show that in a number of reported cases the diagnosis cannot be confirmed. In a survey carried out in Galveston, Texas,

Strandtmann and Eben (p. 919) found positive complement-fixation tests for murine typhus in a high proportion of rats (*Rattus norvegicus*), but the proportion declined rapidly after intensive dusting with DDT was instituted in 1947. The commonest flea was *Xenopsylla cheopis*, and batches of this were found to be infected with murine typhus rickettsiae. Other fleas, mites and rat lice were not proved to be infected. All fleas were sharply reduced by the DDT treatment, but not the mites and lice. The human disease decreased.

Takemori *et al.* (p. 614) claim to have observed simultaneous infection of single cells by the rickettsiae of murine and scrub typhus in mice infected intraperitoneally. Greiff *et al.* (p. 399) note that the multiplication of *R. mooseri* in fertile eggs is speeded up by a single dose of X-rays; other effects are also described.

Wertman and Sarandria (p. 298) have already shown that production of complement-fixing antibodies in response to inoculation of small doses of murine typhus antigen is restricted if the animals are deficient in pantothenic acid, thiamine, pyridoxine or folic acid. They now find that this is also true of vitamin B12.

Yamamoto and Suzuki (p. 805) use a method of neutralizing *in vitro* the toxic effect of doses of *R. mooseri* as a screening method for drugs active in rickettsial infections.

Proteus OXK type: *Vector mite*

In connexion with scrub typhus Harrison and Traub (p. 1033) give an account of the distribution of rodents and insectivores in Selangor, Malaya. Jadin and Vercammen-Grandjean (p. 771) have published a study of larval Trombiculidae of Ruanda-Urundi, in view of recent reports suggesting that scrub typhus may occur there.

Chamberlain (p. 340) studied the eyes in scrub typhus. There were no uniform ocular complaints, but he observed the consequences on the adnexa of the eschar of the mite bite on the eyelid, and he describes oedema of the optic nerve and retina, which usually subsided without residual effects. This was the most common ocular complication. An account of the neurological consequences of scrub typhus, especially relating to deafness, is given by Noad and Haymaker (p. 920), who have followed up Australian soldiers infected in the war. Deafness was common during the attack, but did not persist seriously in many cases.

Smadel *et al.* (p. 207) show that *R. orientalis* may persist in lymph nodes for a year or more after treatment with chloramphenicol. This probably occurs only rarely. Recrudescences of the disease comparable with Brill's disease may be expected to occur.

Ley *et al.* (p. 207) attempted to immunize volunteers by inoculating the virulent Karp strain of *R. orientalis* and giving treatment with chloramphenicol, starting at the time of inoculation or later. No febrile attacks of consequence occurred, except when low doses of chloramphenicol were used, but the subjects subsequently showed good immunity against reinfection. These authors (p. 208) have determined the infective dose of various strains of *R. orientalis* for mice and for man, and they also give a summary of information on minimum infecting doses of other organisms, including *Plasmodium vivax*, certain bacteria and certain viruses.

Indeterminate type: *Vector tick*

An exanthematic fever, probably of the tick-typhus group, is described by Jonchère *et al.* (p. 299) from French West Africa. The Weil-Felix

reaction with *Proteus OX2* was often positive in rising titre, but attempts to isolate rickettsiae were not successful. JADIN and PANIER (p. 1034), however, succeeded in isolating a strain of rickettsiae from a patient in the Belgian Congo and show that it could be agglutinated by antisera of various fevers of the tick-typhus group except tick-bite fever. The patient's serum reacted with various antigens of this group, but only weakly with tick-bite fever antigen.

GIROUD *et al.* (p. 921) show that *R. conori* of boutonneuse fever, when adapted to mouse lung, mutated to a type which in rabbits provoked homologous antibodies and also antibodies to *R. mooseri*, whereas strains grown in yolk sacs did not.

WEYER (p. 22) has made a detailed study of the behaviour of *Rickettsia rickettsi* on intrarectal and intracoelomic inoculation into lice, fleas, ticks, bed bugs and larval *Tenebrio molitor*. Details should be sought in the original abstract, but the conclusion reached is that the tick rickettsiae (*R. rickettsi* and *R. conori*) and the insect rickettsiae (*R. prowazeki* and *R. mooseri*) behave very differently. The louse is not a favourable host for the tick rickettsiae. The same author (p. 102) made similar experiments with *R. akari* in lice, and found that multiplication occurred in certain cells of the midgut and in the coelom, according to the route of infection. It was not possible to obtain experimental evidence that lice became infected by swallowing infected blood. The author thinks that the capacity to develop in arthropods is a fundamental characteristic of all rickettsiae, and that the different species of rickettsiae all have a common origin.

No antigenic differences between the rickettsiae of Rocky Mountain spotted fever and São Paulo typhus could be detected by PEREIRA and TRAVASSOS (p. 615), who used the complement-fixation test.

PRICE (p. 615) records an interference phenomenon in which simultaneous inoculation of guineapigs with small doses of highly virulent *R. rickettsi* and large doses of relatively avirulent *R. rickettsi* or *R. burneti* or other rickettsiae, resulted only in infection of low virulence. He (p. 1035) has studied strains of *R. rickettsi* of different degrees of virulence; all were alike in the numbers required to infect eggs or guineapigs and to kill eggs, and all produced equal amounts of toxin which was lethal to guineapigs and could be neutralized by homologous antiserum. The strains of low virulence multiplied more slowly than the virulent strains in guineapigs. No change in virulence occurred on passage through ticks, but changes in virulence could be achieved by spleen passage in cottontail rabbits and guineapigs, and by a single passage in man.

BELL and PICKENS (p. 922) have studied a toxic substance obtained on yolk-sac cultivation of *R. rickettsi* and other rickettsiae. In a mouse-protection test this toxin could be neutralized by sera of animals or patients convalescent from Rocky Mountain spotted fever, and by the mouse test it was possible to differentiate between *R. conori* and *R. rickettsi*.

PARKER *et al.* (p. 399) in 1939–40 isolated strains of Rocky Mountain spotted fever rickettsiae from *Haemaphysalis leporis palustris* (for the first time) and *Ixodes dentatus* in the eastern United States; the former tick is a probable, though not proved, vector in nature. These strains were of low virulence for guineapigs, thus differing from the Montana strains in *Dermacentor andersoni*. In Laguna, Mexico, SILVA-GOYTIA and ELIZONDO (p. 500) studied cases of spotted fever. They isolated *R. rickettsi* from 3 species of tick—*Rhipicephalus sanguineus*, *Ornithodorus nicollei* and *Otobius lagophilus*—and from patients. The complement-fixation test was found to be more useful than the Weil-Felix. Many mild cases probably occur in childhood. A strain of *R. rickettsi* was recovered by DE RODANICHE

(p. 1132) from *Amblyomma cajennense* from a horse in Panama. Silva-Goytia and Elizondo (p. 697) have used the complement-fixation test for Rocky Mountain spotted fever in domestic animals in Mexico, and have found much evidence that they are susceptible to the disease, which usually occurs in inapparent form. They are more important than dogs in the epidemiology of the disease, though ticks are the real reservoirs of infection.

A study of patients 1–8 years after attacks of Rocky Mountain spotted fever showed that in a high proportion there is damage to the central nervous system and to the heart, which is probably permanent. Rosenblum *et al.* (p. 103), however, observed that only 1 of 7 patients who had received antibiotic treatment within 3 days of the appearance of the rash showed abnormal electrocardiograms.

De Macedo *et al.* (p. 209) show that aureomycin is an extremely successful preparation in Rocky Mountain spotted fever in guineapigs. A solution in 1 per cent. novocaine may be used for subcutaneous and probably for intramuscular injection. A new compound related to chloramphenicol has been shown by Anigstein and Whitney (p. 616) to be capable of suppressing Rocky Mountain spotted fever in animals during the period of administration. Aikawa and Harrell (p. 922) have used cortisone in experimental *R. rickettsi* infection, but its beneficial effects are transitory.

Considerable control of *Dermacentor variabilis* has been obtained by means of DDT distributed along the edges of roads and paths (Knutson, p. 209).

Good results were obtained by Harris (pp. 208, 616) in the treatment of African tick typhus with aureomycin.

Q fever

Philip (p. 299) notes that Q fever is the only accepted name for this disease, and argues that the name *Coxiella burnetii* should be accepted for the pathogenic agent [a view which is not universally accepted].

Derrick (p. 616) has compiled a review of papers on the epidemiology of Q fever, and Berge and Lennette (p. 698) have written a review of the world distribution.

Evidence that Q fever occurs in inapparent form in Ravenna has been produced by Badiali and Zoli (p. 1036) as a result of complement-fixation tests. It is reported from Southern Rhodesia by Gelfand and Berney (p. 1036).

Four cases of laboratory infection are reported by Clavero *et al.* (p. 923).

Babudieri and Ravaioli (p. 23) infected sheep with *R. burneti*; the animals showed only slight symptoms, and were infective for only a short time. Complement-fixation tests became negative after 200 days. From similar work with geese, ducks and pigeons, Babudieri and Moscovici (p. 24) conclude that domestic birds could play a part in transmission of Q fever. Abinanti *et al.* (p. 699) have studied experimental Q fever in sheep infected by intratracheal inoculation. Fleeting rickettsiaemia occurs in the early stages and it seems likely that there is a latent infection which flares up at the time of parturition through multiplication of rickettsiae in the placental tissues.

Experiments on Q fever by Winn and Elson (p. 104) suggest that when colostrum containing antibodies is given to calves the calves do not absorb the antibodies sufficiently for detection in the blood. When calves do show such antibodies they are probably the result of intra-uterine infection.

Q fever occurs in Britain more frequently than is generally realized, and

in a survey of antibodies in the sera of healthy blood donors Marmion *et al.* (p. 501) found positive results at titres of 1 in 10 or more in up to 2·96 per cent. *R. burneti* was found in milk from a considerable number of herds of cattle, but only doubtful results were obtained in examination of ticks. Several outbreaks are considered, and a number of sporadic cases; most of them occurred in spring or summer. In 68 cases there were 4 deaths. An outbreak on a farm in England is described by Stoker and Thompson (p. 299). Circumstantial evidence pointed strongly to pigs as the source of infection, but definite proof could not be obtained. Slavin (p. 617) shows that in Great Britain positive complement-fixation tests have been obtained in 2·1 per cent. of cattle tested, and that infected milk could be detected in 6·9 per cent. of farms in England.

Giroud and Goulon (p. 300) and Giroud *et al.* (p. 502) state that only 3 epidemics of Q fever have been reported in France. Two were in post-office workers believed to have been infected by inhalation of dust from mail-bags contaminated by being carried in railway cattle wagons. The intradermal test is useful in epidemiological surveys but is not recommended for diagnosis because it may cause serious allergic reactions in persons recently attacked by the disease. Discussing an outbreak in Germany Terhaag (p. 923) gives his opinion that the most likely source of infection was a flock of sheep traversing the area, and that air-borne dust contaminated with infected discharges from the sheep (especially connected with placental material) was the probable agent. There was a close association between the lambing season and the occurrence of the disease in each locality. An outbreak among butchers and men working with domestic animals in Yugoslavia is reported by Cvjetanović *et al.* (p. 1133), who think that the infection was introduced by sheep. Pneumonia developed in one-third of the patients, presumably indicating a dust-borne infection. One laboratory worker was involved.

In the Tafilalet region of French Morocco Garin (p. 616) found that 37·5 per cent. of a group of inhabitants gave positive reactions to the micro-agglutination test for Q fever. Higher figures were obtained in cattle, sheep and goats. Hypersensitivity tests on villagers in two places in Oubangui-Chari indicate that Q fever is imported by flocks travelling along a main road, and that boutonneuse and murine infections are indigenous to the animals of the locality (Giroud *et al.*, p. 101).

Perez Gallardo *et al.* (p. 924) produce evidence from complement-fixation tests that Q fever is widespread in mountain rabbits and dormice in Spain. These authors (p. 698) confirm earlier work which showed that dogs are susceptible to Q fever, and they call attention to the need to investigate the part they play in natural transmission of the disease. Mantovani and Benazzi (p. 617) in Italy have isolated *R. burneti* from a dog and from *Rhipicephalus sanguineus* removed from it. The dog was probably infected through eating placental tissues of infected sheep.

Tendeiro (p. 400) has isolated *R. burneti* from ixodid ticks and from cows' and goats' milk in Portuguese Guinea.

Natural infection with *R. burneti* has been found in *Ornithodorus lahorensis* in Turkey (Payzin and Akkay, p. 103). Weyer (p. 923) has written a monograph on *R. burneti* and its relationship with arthropods. Natural infection has been found in ticks of 8 genera, but the general impression is that little is definitely known of the part played by arthropods in natural transmission of the disease.

A serological study of strains of *R. burneti* is reported by Berge and Lennette (p. 700). There are puzzling discrepancies between the complement-fixing and the immunizing antigens of certain strains, but tests

indicate a high content of antigenic components common to all strains. The paper should be studied in full.

Siegert *et al.* (p. 401) studied the complement-fixation and agglutination tests in Q fever. In untreated patients the peak titre for the complement-fixation test was reached in 5–10 weeks and the titre had fallen appreciably at 20 weeks. The test remained positive for 3 years in several patients. The micro-agglutination test reached maximum titre at about 6–8 weeks, but this titre was much lower than with the complement-fixation test, and the micro-agglutination test became negative in most cases within 2 years.

Onul and Uysalefe (p. 502) describe the skin test in Q fever in which the antigen prepared from egg cultures and diluted 1 in 100 is injected intradermally. A positive reaction can be read at 40 hours and is obtained on the 3rd to 8th day of illness and persists for 4 years or more. The test becomes positive earlier than the complement-fixation test and is therefore valuable in diagnosis. Lopes (p. 301) found the intradermal test for Q fever more sensitive than the complement-fixation test. The antigen was the Henzerling strain and the true reaction became obvious in 24–48 hours; this sometimes went on to local necrosis and a general febrile reaction. Maurin (p. 925) shows that the use of Q fever antigen for the intradermal sensitivity test may be enough to render the animal positive to the complement-fixation test, which, therefore, is of no value in animals in which the skin test has previously been performed.

Q fever may simulate the early stages of pulmonary tuberculosis. Favez (p. 301) describes cases in which X-ray and clinical features could have given rise to confusion. The fever curve of Q fever has no characteristic feature. A persistent nodular infiltration of the lungs in a patient with Q fever is described by Meyer and Naveau (p. 503).

Mice treated with chloramphenicol after inoculation with *R. burneti* developed complement-fixing and immunizing antibodies to the same extent as untreated mice (Visco, p. 1036).

Malloch and Stoker (p. 400) tested the effect of various chemical disinfectants on the Henzerling strain of *R. burneti*, finding that those normally used in the preparation of vaccines usually failed to kill all the organisms. They consider that the few which survive, however, are probably not dangerous. Although guineapigs inoculated with a killed vaccine of *R. burneti* gave positive serological tests, Siegert *et al.* (p. 925) found that they had no real immunity against infection.

Tests of methods of pasteurization of milk indicate that the usual procedures give adequate protection against Q fever (Bingel and Engelhardt, p. 104).

Rickettsialpox

In New York, where 624 cases have been reported in 6 years, rickettsialpox tends to occur in blocks of flats occupied by families of middle and upper income groups, and is associated with refuse chutes leading to incinerators in the basements, which are infested with mice. Nichols *et al.* (p. 1034) show that the outside walls of the incinerators themselves provide ideal conditions for the mouse mite *Allodermanyssus sanguineus*. In rat-infested slums the disease is less common.

LaBoccetta *et al.* (p. 805) report 4 cases of (probable) rickettsialpox in Philadelphia.

Charles Wilcocks

MALARIA

In this section abstracts are arranged as far as possible in the following order:—Human malaria—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control;* Animal malaria—*monkeys, other animals, birds.*

World Health Organization. Technical Report Ser. No. 80. **Expert Committee on Malaria. Fifth Report.** Istanbul, 7–12 September, 1953. 42 pp. [Refs. in footnotes.] Geneva: 1954, June. [1s. 9d.; $0.25; Sw.fr.1.–.]

The four previous reports of this Committee [this *Bulletin*, 1948, v. 45, 948; 1951, v. 48, 2, 699] have had as their themes the opening of a new era and the possibility of complete control; the difficulties to be overcome before this could become general; general recognition of success with, however, some remaining difficulties; and the fact that even the most stubborn obstacles in Africa could be overcome. The fifth report now has as its theme a record of consistent success under all types of difficulty and the formation of policy in a world from very large areas of which the disease has actually been eliminated. This would include the more economical management of schemes by the greater selectivity in treatment and extension of the functions of staff to cover other subjects, coordination of malaria control with other forms of social advance, and the discontinuation of residual insecticide applications in places of full elimination of malaria together with the substitution of sentinel and emergency services. The report also has in comparison with past ones a more liberal attitude towards other methods of control which can no longer be considered to be in competition with imagocidal methods but as complementary to them.

The utility and dosage of the traditional insecticides are considered in some detail. The need for variation of dose and cycle to suit local conditions is emphasized but standard recommendations for normal conditions are: DDT, 2 gm. per square metre every 6 months; *gamma* BHC 0·2 gm. per square metre every 3 months, and for dieldrin a tentative suggestion of 0·6 gm. per square metre every 12 months is made. Two subjects not fully understood and demanding considerable research are the interaction of insecticides with mud walls, and the development of resistance to insecticides by anophelines. Both of these could present impediments to control though neither has so far actually prevented its attainment. The full elimination of malaria in some areas and notably in parts of Greece and Crete is discussed; subject to the attainment of full elimination a cautious discontinuation of spraying is thought to be fully justifiable, provided that an adequate sentinel service is established and an emergency organization kept in readiness supplied with insecticides and drugs to undertake control around any detected cases. This policy is necessarily tentative but it seems possible that control may be stopped in many other areas besides those in which the pioneer closures have been made.

The Committee welcomes the arrival of pyrimethamine (daraprim) and of primaquine, and brings up to date its previous summary of the activity of antimalarial drugs. Proguanil has stimulated drugs resistance and it seems very probable that pyrimethamine will do so, though it is unlikely with the other groups of drugs in use. For this reason it is recommended that these two drugs should be reserved exclusively for prophylactic purposes and not used in therapeutics. The summary of recommended dosages is similar to that prepared by another authority and published elsewhere in this *Bulletin* [1954, v. 51, 861], except that considerably smaller doses

of mepacrine are advised in this WHO report for the treatment of the overt attack [200 mgm. thrice daily for 2 days, 100 mgm. thrice daily for 5 days; or 1 gm. (5 doses of 200 mgm.) on the first day and 100 mgm. thrice daily for the next 6 days]. A larger dose of mepacrine is recommended for semi-immune subjects [600 mgm. in a single dose].

Annexes of detailed supporting documents include: a method of measuring the longevity of mosquitoes by comparison of immediate and delayed sporozoite rates; a technique for assessing susceptibility of anophelines to insecticides; criteria of malaria eradication, and the statement on chemotherapeutics referred to above.

[The report is most constructive and, like its predecessors, should lead policy for some considerable time.] *G. Macdonald*

East Africa High Commission. **East African Malaria Unit Annual Report 1953** [Wilson, D. Bagster, Director]. 7 pp. 1954. Nairobi: Govt. Printer.

Work described in previous reports [this *Bulletin*, 1953, v. 50, 999; 1952, v. 49, 913] continues but on a limited scale owing to the absence of members of the staff on leave. Entomological studies concern the density of *Anopheles gambiae* and *A. funestus*, their age groups and biting cycle, and the maxillary index and biological races of *A. gambiae*. At the peak of density it was found by a census that there were about 15,000 females of the 2 species feeding at one time on a village population of 315 people, the density per person being 48. Continued catching throughout the year showed that the number was greatly reduced, perhaps at times to 1/30th or 1/40th of this figure during the dry weather, but in the course of the year each person is believed to have been bitten by more than 200 " presumably infective mosquitoes " [but the assumption of infectivity from the presence of sporozoites in the glands is not certain].

Old and young female mosquitoes tend to bite at different times of night and as a result the risk of inoculation with malaria is greatest around midnight.

The maxillary indices of 3 series of *A. gambiae* were 14·7, 14·9 and 13·8. It was, however, found that individual batches of eggs produced anophelines with varying maxillary indices according to the temperature of the water in which they were raised, and also that the indices of mosquitoes feeding on cattle and on man were identical. It is concluded that the index is of much less value in the study of the epidemiology of malaria than has been postulated elsewhere.

A number of epidemiological surveys were made. One carried out in the Paré area showed that in this region *A. gambiae* fed very frequently on cattle, very commonly rested outdoors, and had a low sporozoite rate of 0·25 per cent. Observations have also been made on an uncommon mosquito, *A. machardyi*. This is a forest species, none of the specimens examined having been found to be positive for human blood, but in 15 of 1,496 sporozoites have been found, presumably not human in origin.

An estate malaria control scheme by the use of BHC and DDT is reviewed: 1·25 to 2 gm. per square metre of BHC was effective in controlling anopheline density for 3 months, and 2 gm. of DDT per square metre had the same result. Examination of blood films from adults showed no reduction in the parasite rate. It is concluded that there is no evidence that, in an area of fairly high endemicity, this form of control is of value in reducing the malaria transmission level when applied to single estates of about 700 houses. *G. Macdonald*

Colligнon, E. & Juillan, M. Les indices endémiques palustres de 1953 dans le voisinage de la Station expérimentale du Marais des Ouled Mendil. [**Malaria Endemic Indices in the Experimental Station of the Ouled Mendil Marsh and its Neighbourhood**] *Arch. Inst. Pasteur d'Algérie.* 1954, Mar., v. 32, No. 1, 30–32, 1 plan.

The interesting story of the reclamation of this Algerian marsh was related by Ed. Sergent and Et. Sergent in 1947 [this *Bulletin*, 1948, v. 45, 937]. The enterprise was begun in 1927: it continues an unqualified success. Not a single labourer engaged in agricultural pursuits or the upkeep of reclamation works has ever contracted malaria in those 890 acres of formerly malarious marshland. All the families residing in the area remain malaria-free: infants born there grow up uninfected. Not a single anopheline breeding place can be found in the area.

Each year in the spring and autumn an inspection is made of the settlers who live in the 4 villages situated just outside the confines of the experimental station. In the spring and autumn of 1953, 337 and 267 children living in these settlements were examined. On both occasions their spleen rate approximated to 2 per cent., from which one may infer the absence of malaria transmission during the hot months and the absence of infected mosquitoes. [For 1952 report, see this *Bulletin*, 1953, v. 50, 998.]

Norman White

Mills, A. R. **A Malaria Survey of Futuna in the New Hebrides.** *J. Trop. Med. & Hyg.* 1954, May, v. 57, No. 5, 99–107, 2 maps & 9 figs.

The survey was undertaken primarily to discover whether malaria was present in this island which lies on the border of the non-malarious Pacific zone at 19°31′ South and 170°11′ East. Thick blood films were taken from 286 of the 294 people on the island and no malaria parasites were seen in any film. Only one of 286 examined had a palpable spleen. No anopheline mosquitoes were seen in spite of careful searching throughout the island. Many culicines were seen and the following were bred from larvae and pupae: *Aëdes scutellaris scutellaris*, *Culex sitiens* and *Tripteroides coheni*. The absence of anophelines is not due to absence of potential breeding places as there are permanent water sources and places suitable for breeding of *Anopheles farauti* which exist in neighbouring islands. The author considers that the mosquito and malaria must have been introduced on many past occasions and failure of establishment must be due to some ecological or physiological factor which makes Futuna an unsuitable breeding place for *A. farauti*, and it is possible that this is the reason for the freedom of some Pacific islands from malaria.

G. Macdonald

Molas, M. A. La morbilidad palúdica en Las Palmas (Departamento del Río Bermejo). [**Malaria Morbidity in Las Palmas, Rio Bermejo Department, Argentina**] *Asoc. Argentina Para Estudio Enfermedades Transmisibles. Actas y Trabajos.* 1953, Oct., v. 2, No. 4, 23–5.

Las Palmas is situated in the north of Argentina, bounded on the east by the Rivers Paraná and Paraguay and extending westward some 50 kilometres into the Gran Chaco. Its population is estimated at 17,000, predominantly of white races, of which 5,000 are connected with industry and the remainder with agricultural pursuits of which the raising of sugarcane is the chief. From April to August the population may be increased

by 1,500 to 2,000 seasonal workers from the neighbouring Formosa territory for work in the sugar-cane harvest.

In the years 1948 and 1949 the numbers of cases of malaria treated by the medical service were 202 and 166, respectively, an incidence much in excess of the average. Both outbreaks began in April, reached their height in July and declined rapidly in September; they thus corresponded with the influx of labourers from Formosa. Incidence was higher in the rural than in the industrial population. Male patients exceeded female patients in the proportion of 3 to 1. *Plasmodium vivax* was responsible for all infections observed. Splenic enlargement was very rarely noted. Three species of *Anopheles* have been identified, *albitarsis*, *darlingi* and *triannulatus*.

In 1951 only 58 cases were recorded: systematic spraying of dwellings with DDT was carried out in 1950 and 1951. *Norman White*

Lozano Morales, A. El estadio invernante del "Anopheles maculipennis atroparvus" y su relación con la pausa estacional del paludismo en España. [**Wintering Conditions of** *Anopheles m. atroparvus* **and its Relation to Seasonal Transmission of Malaria in Spain**] *Rev. Sanidad e Hig. Pública.* Madrid. 1953, May–June, v. 27, Nos. 5/6, 303–25, 18 figs. (10 on 3 pls.). [12 refs.]

Guelmino, D., Kostić, D. & Jevtić, M. [**Contribution to the Study of** *Anopheles* **of Serbia**] *Glas Srpske Akademije Nauka; Odeljenje Medicinskih Nauka.* Belgrade. 1951, v. 204 (n.s.), No. 4, 153–68, 2 charts. [In Serbian.] English summary.

The following notes are abstracted from the English summary:—*Anopheles maculipennis messeae* is restricted to a narrow belt of flats along the northern rivers of Serbia, the Sava and the Danube. *A. m. typicus* occurs over the whole central and southern territories while in the northern marshy lands it occurs with *A. m. messeae* and *A. m. atroparvus*. Geographical, seasonal and ecological population figures are given for the forms of *A. maculipennis* as well as some information on their biology and physiology.

A. bifurcatus [*claviger*] is widespread in its geographical distribution but it is said to live mainly away from human habitations. *A. superpictus* is not numerous and is of secondary importance as a vector of malaria. *A. nigripes* [*plumbeus*] has been found in many places and *A. hyrcanus* [possibly var. *pseudopictus*] in one locality only. *H. S. Leeson*

Weyer, F. Bestimmungsschlüssel für die *Anopheles*-Weibchen und -Larven in Europa, Nordafrika und Westasien. [**Key to the Female** *Anopheles* **and their Larvae in Europe, North Africa and Western Asia**] 2nd enlarged Edition. 38 pp., 102 figs. [20 refs.] 1954. Leipzig C1: Johann Ambrosius Barth, Salomonstrasse 18B. [DM 2.–.]

This is a second, revised and enlarged edition of the author's keys for the identification of the species of *Anopheles* known to occur in Europe, western Asia and northern Africa. The main keys are to the females and larvae of *maculipennis* as a group and to the following species: *sacharovi, algeriensis, plumbeus, claviger, coustani, hyrcanus, pulcherrimus, pharoensis, stephensi, gambiae, dthali, superpictus, multicolor, sergenti, hispaniola, turkhudi* and of the female only of *italicus*.

The last 3 run down together in the adult key and *italicus* is omitted from the key to the larvae; *marteri* is omitted from both keys but there are notes about both these species accompanying the keys.

There is in addition a supplementary key for the identification of the eggs of the members of the *maculipennis* complex.

Throughout the paper there are notes giving details of geographical distribution and other notes drawing attention to particular morphological characteristics which are simply but clearly illustrated by line drawings and halftone blocks, most of which have been borrowed from other authors. The text is concisely put together in German. *H. S. Leeson*

Maillot, L. Étude de l'infection palustre et de l'indice maxillaire chez *Anopheles gambiae* Giles à Brazzaville de décembre 1950 à février 1951. [**Study of Malarial Infection and Maxillary Indices in** *Anopheles gambiae* **in Brazzaville from December 1950 to February 1951**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 5, 839–47, 2 graphs. [11 refs.]

Collections of *Anopheles gambiae* were made in huts at Poto-Poto, near Brazzaville, French Equatorial Africa, between 7 and 9 a.m. every morning from December 1951 to February 1952 [these are the dates given in the text: they differ from those in the title]. The mosquitoes were dissected and examined for sporozoites and their maxillary indices were noted. At the same time the characteristics of the breeding places were recorded.

The accumulated data are presented in this paper and discussed. The figures are divided according to the 6 periods of the work and those for 100 females from each period are analysed.

It was seen that the amount of rain influenced the nature of the breeding places and so affected the maxillary index of the mosquitoes; abundant rainfall often diminished the amount of breeding in the temporary pools and puddles, while the slackening of the rainfall increased it. Other authors have shown that casual waters with lower organic content produce specimens of *A. gambiae* having lower maxillary indices than more permanent waters with richer organic content. The present observations seem to confirm this point.

Maxillary indices are shown as ranging from 10 to 17, the mean falling just below 14. The dissimilarity which is shown to exist from period to period may be accounted for by the presence, around Brazzaville, of 2 or more races of *A. gambiae*, the predominance of one or the other being reflected in the rise and fall in the mean index.

The author concludes that one race is paucidentate (maxillary index of 12 or less) and these individuals are anthropophilic and possibly exophilic; the better malaria vectors fall into this category. The other race contains those which are multidentate (12·5 and over) and endophilic; the anthropophily of these individuals is not so strong and they are weaker though still important vectors of malaria. *H. S. Leeson*

Gillies, M. T. **The Recognition of Age-Groups within Populations of** *Anopheles gambiae* **by the Pre-Gravid Rate and the Sporozoite Rate.** *Ann. Trop. Med. & Parasit.* 1954, Mar., v. 48, No. 1, 58–74, 4 figs. [21 refs.]

A study of the literature on ovarian development in Anopheline mosquitoes in natural populations has revealed the paucity of African records. Two points, however, are relevant to the present enquiry. Firstly, female

mosquitoes may occasionally, or regularly, take multiple blood meals in the course of the same gonotrophic cycle; and secondly, such females may or may not be fertilized and therefore may or may not be immediately recognized as newly emerged.

This problem and its implications were examined at Tengeni, Tanganyika, with the mosquito *Anopheles gambiae*, in which species 3 age groups were recognized. Engorged females containing fresh blood were selected and kept for 24 (or 48) hours until digestion of the blood was nearly completed; they were then killed. Those specimens with abdomens relatively collapsed and with ovaries in Christophers's stage II were put into the first group, the newly emerged or pregravid females. Nearly all of these need at least 2 blood meals to complete the first gonotrophic cycle. The proportion of such females in the biting population is defined as the pregravid rate. The validity of the method is discussed with reference to the fertilization rate, changes in the ovaries and oviducts and the influence of rainfall. It is concluded that the rate is a valid measure, though there is a small proportion of the group composed of old multiparous females showing gonotrophic discordance.

The remaining females were then subdivided on the basis of the presence of sporozoites in the glands into the second group called gravid and the third group gravid and infective. The sporozoite rate in the third group was adopted as the standard method of assessing the level of infection in the *A. gambiae* population. This rate varied inversely with the number of the biting population.

Age-group changes within the population are responsible for short-term fluctuations in the sporozoite rate, while the average level of the rate is determined mainly by extrinsic factors. For a proper assessment of the infective potentialities of this species, analyses need to be carried out over an extended period. By the very impermanence of its preferred breeding places, some element of instability in the age composition of *A. gambiae* populations is to be expected wherever the species occurs, and this work has demonstrated the fact.

[This is an important paper, full of experimental data which should be studied in the original.] *H. S. Leeson*

van Thiel, P. H. **Trematode, Gregarine and Fungus Parasites of** *Anopheles* **Mosquitoes.** *J. Parasitology.* 1954, June, v. 40, No. 3, 271–9, 4 figs. [24 refs.]

"1. Papers on the occurrence of trematodes in *Anopheles* mosquitoes, on their larval development and on their development into the adult fluke *Pneumonoeces variegatus* Rud. in the lungs of the frog, have been reviewed, because they have been lost in the literature.

"2. A gregarine *Diplocystis metselaari* n. sp. has been described, found by Metselaar in female *Anopheles farauti* in Dutch New Guinea. For the species, found by Johnson (1902) in *Anopheles maculipennis*, the name *Diplocystis johnsoni* n. sp. is proposed.

"3. A fungus parasite, *Coelomomyces walkeri* n. sp., has been described from two female *Anopheles tessellatus*, caught in Indonesia. This species is identical with type 1 of this genus found by Walker in *Anopheles gambiae* in Africa.

"4. Type 4 of *Coelomomyces* found by Walker in the same mosquito and the species observed by Manalang in common species of *Anopheles* in the Philippines are denominated *Coelomomyces ascariformis* n. sp."

See also p. 1112, McNeel & Ferguson, **Mosquito Distribution and Abundance in the Arkansas-White-Red River Basins.**

Deane, L. M., Damasceno, R. G. & Arouck, Regina. Distribuição vertical de mosquitos em uma floresta dos arredores de Belém, Pará. [**Vertical Distribution of Mosquitoes in a Forest in the Belém Region, Brazil**] *Folia Clin. et Biol.* S. Paulo. 1953, Sept., v. 20, No. 2, 101–10, 2 figs. on 2 pls. [13 refs.] English summary.

The English summary appended to the paper is as follows:—

"*Anopheles darlingi* preferred to bite near the ground, but was found feeding up to the 15 meters level. *Anopheles mediopunctatus* and *Anopheles shannoni* showed a definite preference for the baits at the higher platforms, in spite of the fact that their larvae breed in ground pools or rivers. Such preference may explain why adults of these two species are usually much rarer than their larvae in material obtained in routine entomological surveys, in which the imagos are searched for in houses or caught on baits placed on the ground.

"Of the other species, some preferred to feed at the lower levels, like *Culex coronator, Aëdes scapularis, Aëdes serratus, Mansonia arribalzagae, Psorophora albipes, Psorophora ferox* and *Wyeomyia roucoyana*; others were taken in larger numbers at the higher platforms, like *Haemagogus spegazzinii, Sabethes belisarioi, Sabethes chloropterus* and *Sabethes glaucodaemon*; the remaining species—*Culex spissipes, Culex* sp. and *Mansonia fasciolata*—were rather indifferent, showing a less marked tendency to feed at the higher or lower levels."

Wallace, M. F. **Resochin—Single Dose Therapy and Mass Suppression.** *Med. J. Malaya.* 1954, Mar., v. 8, No. 3, 251–9.

In a previous paper [this *Bulletin*, 1952, v. 49, 231] the author reported the successful single-dose treatment of malaria among the labour force of a rubber estate in Malaya with amodiaquine (Camoquin). The investigation now recorded was undertaken to find out whether equally good results could be obtained by a single-dose treatment with Resochin (chloroquine), the cost of which is very much less than that of amodiaquine. Proguanil had been hitherto used for suppression, but there had been some cases of fever under this régime which had responded to single-dose treatment with Resochin, and therefore it was decided to try the latter drug for suppression also.

In 1952, 33 patients each received a single-dose treatment of 4 tablets of Resochin. [Each tablet contains 150 mgm. chloroquine base.] Of these, 75 per cent. had no pyrexia after the first day. In 1953, 67 patients received the same treatment, and 69 per cent. had no pyrexia after the first day. In the same year 31 patients received a single-dose treatment of 3 tablets only, and, of these, 71 per cent. had no fever after the first day. [The figure recorded after a single-dose treatment with 3 tablets of amodiaquine was 84 per cent.]

The results of mass suppression with Resochin (2 tablets on the same day each week) were also successful, the degree of protection attained being greater than with any other drug tested.

Tables show the results for each patient in all 3 treatment series, a summary of these results, and the malaria rates in the various divisions of the estate after different prophylactic measures. *G. Covell*

Chinn, H. I. & Redmond, R. F. **Effect of Primaquine on Hypoxia Tolerance.** *J. Applied Physiol.* 1954, June, v. 6, No. 12, 773–5.

"Although significant quantities of methemoglobin were produced when Primaquine was administered in the usual therapeutic doses, no impairment in the ability of the subject to retain useful consciousness at altitude could be detected. Even less effect would be expected at altitudes normally traversed by transport planes (5,000–10,000 ft.). Thus, in the light of our present knowledge, there is no contraindication to the air transport of persons receiving Primaquine."

Houel, G. & van Goor, W. T. Prophylaxie médicamenteuse du paludisme par des doses mensuelles de chloroquine et d'amodiaquine. [**Chemoprophylaxis of Malaria with Monthly Doses of Chloroquine and Amodiaquine**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 254–60, 2 figs.

The observations here recorded were made in a group of villages situated in the district of Rabat, in French Morocco. With the introduction of residual insecticides malarial endemicity has decreased in this area in recent years, and the condition most frequently encountered is one of hypo-endemicity, carrying with it the risk of periodical epidemics. Mass distribution of drugs at weekly or fortnightly intervals is impracticable for a number of reasons, among them being the scattered distribution of the population and the limited funds available.

Three villages situated about 1 km. from a marsh and 3 to 5 km. from one another were selected for the experiment. Only children were treated, the dosage of amodiaquine (Flavoquine) and of chloroquine (Nivaquine) being calculated at 10 mgm. per kgm. body weight. [Presumably this dosage is in terms of base, though this is not stated in the text.]

In village A, 76 children received a single dose of amodiaquine once monthly from June to September inclusive. At the end of this period the parasite index had fallen from 27·6 to 9·2 per cent., and the spleen index from 73·8 to 53·9 per cent. The size of the average enlarged spleen also showed a marked decrease.

In village B, 74 children received a monthly dose of chloroquine during the same period. The parasite index fell from 30·8 to 5·2 per cent. The spleen index showed practically no change, but there was a decrease in size of the average enlarged spleen.

In village C, where no drug was given, the parasite index among 53 children examined rose from 16·9 to 39·6 per cent. and the spleen index from 67·9 to 84·9 per cent. The size of the average enlarged spleen was also considerably increased.

It is concluded that under mesoendemic conditions, a single monthly dose of amodiaquine or chloroquine of 10 mgm./kgm. body weight has a marked effect in reducing the incidence of malaria. No evidence of toxicity was observed with either drug. *G. Covell*

Houel, G. Prophylaxie du paludisme par une dose unique mensuelle de pyriméthamine. [**Prophylaxis of Malaria with a Single Monthly Dose of Pyrimethamine**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 260–62.

This work was carried out in 2 villages situated in a mesoendemic malarial zone 80 km. from Rabat. The villages were 2 km. distant from a marsh and 3 km. from one another.

In village A, 66 children were given a single monthly dose of Malocide (pyrimethamine) from June 26 to October 16. Those below one year received 25 mgm. in each dose, those over one year 50 mgm.

During the period of treatment the parasite index fell from 10·7 per cent. to nil, and the spleen index from 72·1 to 42·6 per cent. The size of the average enlarged spleen was also markedly reduced. There was no evidence of toxicity.

In village B, where no drug was given, the parasite index among 65 children, which was 12 per cent. at the beginning of the experiment, had risen to approximately 50 per cent. one month later and remained at this figure during the next 2 months. On October 16 it was still as high as 20·8 per cent. The spleen index and size of average enlarged spleen showed no significant change.

It is concluded that in a mesoendemic zone a monthly dosage of 25 mgm. pyrimethamine to children below one year and 50 mgm. to those over one year can effect a marked reduction in the incidence of malaria. *G. Covell*

Houel, G. Note sur le traitement du paludisme épidémique par une dose unique de pyriméthamine. [**Treatment of Epidemic-Malaria with a Single Dose of Pyrimethamine**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 262–4.

In August 1953 there was a sudden rise in malaria incidence, particularly among children, in a village 80 km. north-east of Rabat, a zone classified as mesoendemic. This village had previously been protected by spraying the houses with DDT, but had been treated during 1953 by a different insecticide which proved ineffective.

Mass treatment with a single dose of pyrimethamine was given as follows: adults, 100 mgm.; children over 1 year, 50 mgm.; children below 1 year, 25 mgm.

Examination of 147 children showed a parasite index of 14·6 before the drug was administered. This figure had fallen to 5·5 per cent. one week later, and showed a further fall to 2·7 per cent. 30 days after treatment. The number of cases of fever fell from 9 before treatment to 2 a week later (one a relapse) and nil at the end of the 30-day period. No evidence of toxicity was observed.

It is concluded that single-dose mass treatment with pyrimethamine is likely to prove a satisfactory method of dealing with epidemics of malaria such as those which occur in French Morocco. *G. Covell*

Miller, M. J. **A Comparison of the Antimalarial Effects of Suppressive Doses of Chloroquine, Amodiaquin, and Pyrimethamine.** *Amer. J. Trop. Med. & Hyg.* 1954, May, v. 3, No. 3, 458–63, 2 graphs.

These observations were carried out in a hyperendemic area in Liberia, where *Plasmodium falciparum* is the preponderant malaria parasite, the object being to evaluate the comparative value of chloroquine, amodiaquine and pyrimethamine in the suppression of malaria.

One hundred and forty-eight African children from 6 to 14 years of age were divided into 4 groups: *Group A* included 49 children, who received 12·5 mgm. pyrimethamine weekly; *Group B* included 36 children, who received 0·15 gm. chloroquine base weekly; *Group C* included 36 children, who received 0·2 gm. amodiaquine weekly [presumably base, though this

is not stated]; *Group D* included 27 children, who received no drug and acted as controls. The study covered a period of 12 weeks from August to November 1953. The initial parasite rate in the different groups ranged from 48 to 63 per cent.

A study of the parasite rates in the 4 groups showed that in the dosage employed all 3 drugs were highly effective in clearing the blood of asexual parasites. Chloroquine showed the most rapid action, but pyrimethamine, though somewhat slower, proved equally effective in eliminating parasites from the peripheral blood. Amodiaquine appeared slightly less effective, and in several children in this group a temporary break-through was observed.

By the end of the 12-week period there was an equally marked regression in spleen rates and size of average enlarged spleen in all 3 groups treated. The initial reduction appeared to be somewhat more rapid in the amodiaquine group than in the other two. *G. Covell*

Bernard, P. M. Trois ans de lutte antipaludique à Madagascar. 1950–1951–1952. [**Three Years of the Campaign against Malaria in Madagascar**] *Bull. de Madagascar.* 1954, May, No. 96, 387–458, numerous figs.

Before 1949 the 4·5 million people of Madagascar were universally exposed to malaria. The disease was holo- or hyper-endemic in 53 of the 80 districts and was the most important one in its clinical effects; the death rate was then 19·9 and the birth rate 22 per 1,000. In 1952–3 malaria was hyper-endemic in 3 districts only and holo-endemic in none; the death rate was 13·1 and the birth rate 31·3 per 1,000; in the capital, Tananarive, only 4 of the blood films taken from 39,130 people examined at random were positive, and only 42 were positive of 17,343 films taken from patients attending hospital; *Anopheles funestus* had disappeared from the plateau and was rare elsewhere, while *A. gambiae* was still present but no longer capable of carrying malaria, no sporozoites having been seen in 1,700 dissected in 1952–3. An exophilic and partially zoophilic biotype may possibly have been isolated and remained as a remnant of the endophilic and anthropophilic species.

A malaria organization has existed since 1921, and has carried out the traditional methods of larval control and quinine prophylaxis up to 1948 with, it is admitted, negligible results. In the latter year chemoprophylaxis was first applied to schoolchildren and in 1949 imagocidal control was added and has since become the primary means of control, while larvicidal attack has diminished in importance. In a Foreword by General Gourvil the credit for the change and the activity is given to the author, Colonel Bernard.

The account is comprehensive and deals with the general ecology of Madagascar, its anopheline fauna, the malaria campaign, its results and costs. The section on ecology supplies a background necessary for the full understanding of the remainder. Thirty-one species of anophelines prevalent are listed and their habits briefly described. Two, *A. funestus* and *A. gambiae*, are known to have been important vectors, but the number of gland dissections known to have been carried out before 1949 was limited and they were confined to the relatively cool and mildly malarious plateau. The sporozoite rate in *A. funestus* was 1 per cent. and in *A. gambiae* 0·8 per cent. The author considers that there may have been other vectors not

identified. [Further series of dissections are recorded by Wilson, this *Bulletin*, 1947, v. 44, 952.] Anthropophilic indices are given for 6 species.

The following insecticides have been used for imagocidal control: DDT in suspension and solution at a dose of 2·2 gm. per square metre of active product; a mixture of DDT and BHC at a dose of 1·5 and 0·15 gm. per square metre, respectively, of active product; and a mixture of DDT, Octochlorodiphenyl [Octochlor] and BHC to give 0·6, 0·56 and 0·16 gm. per square metre, respectively. The last-named mixture has been found much the best for its immediate and residual effect, having a well-confirmed activity of 6 months known to extend in some cases to 9 months. In particular it has not given rise to any form of insect resistance. Insecticide is applied by 25 elaborately organized spraying gangs distributed around the island. Though efforts have been made to reach everyone, about a third of the population has not been protected by this means owing to the inaccessibility and isolation of their homes. Nivaquine (chloroquine) is used for prophylaxis and given universally through clinics, special organizations and schools, to all children from birth to school- or college-leaving age in doses which vary from 0·05 to 0·3 gm. once a week according to age [the doses appear to be in terms of an unstated salt, not of base]. It is regarded as secondary in importance to imagocidal attack and an experiment has been made in discontinuation among 30,000 schoolchildren for 7 months of the year at the end of which malaria parasites were found in 4 of 24,745 films examined among them. Changes in spleen rates are recorded by districts as already briefly commented on. Data on the parasite rates are confined to the capital Tananarive. Mortality changes are recorded and show material decrease in the death rate of all age groups, with the result that the population which was approximately static is now increasing at a rate of about 18 per 1,000 per annum. The costs of the scheme were originally partly borne by the French Government but are now entirely carried out of local funds; for the last 3 years they average 136 metropolitan francs per person per annum and are decreasing.

[The account, which is most lucid, will be of great interest to all concerned in malaria control in Africa, and should be consulted in detail in the original.] *G. Macdonald*

Gillette, H. & Gilkes, C. **Notes on some Field Experiments mainly with Dieldrin Formulations.** *Caribbean Med. J.* 1953, v. 15, Nos. 3/4, 74–91.

Dieldrin is a comparatively new insecticide which has been reported to demonstrate outstanding effectiveness at low economical doses in the control of many insect pests. It is effective both as a contact and as a stomach poison and is unaffected by the presence of alkalis and acids which are normally present in soil. On wall surfaces an adequate residual action is obtained by an application of 10 mgm. per square foot. It is also an efficient larvicide when used at the rate of 1 to 1½ gallons per acre of water surface, the solution being of a strength of 3 lb. of dieldrin (active material) per 100 gallons of water. In these experiments in Trinidad, 2 formulations were used: (a) dieldrin 25 per cent. wettable powder, which is a dust containing 25 per cent. by weight of the active material; a stock suspension is prepared by mixing 0·12 lb. of this powder in 1 gallon of water; this is applied at the rate of 5 quarts per acre: (b) dieldrin HSD, which is a high-spreading antimalarial oil similar to malariol HS but containing dieldrin in place of DDT. It is sprayed on water surfaces at the rate of

½–1 gallon per acre, or it may be poured on the water surface at points up to 20 ft. apart.

The field trials are described in considerable detail and the results in the form of larval counts are tabulated. The anophelines involved were *Anopheles albitarsis* and *A. neomaculipalpus*; *A. aquasalis* was occasionally seen. The trial waters were principally grassy pools and included actual rice fields. It is of interest to note that no adverse effect was noted on the growing rice as a result of its being sprayed with dieldrin, and the treated field seemed to flower and fruit as well as the rice in an adjoining untreated field. Tests were also conducted with dieldrin 25 per cent. wettable powder in running water, a river being chosen for this purpose.

In brief, the results showed that dieldrin 25 per cent. wettable powder gave adequate control of anophelines for periods of at least 14 days after application, at a dosage of 2 ounces per acre. A cumulative effect which gave control for a much longer period was noted after several treatments. This formulation gave better results than DDT and BHC at their respective standard rates of application. Ill-effects on other water fauna became evident only if a dosage of ½ lb. to 1 lb. per acre was employed.

The high-spreading oil containing dieldrin proved to be as effective as the similar preparation containing DDT when used in similar circumstances.

R. Ford Tredre

Mercado, Teresa I. & von Brand, T. **Glycogen Studies on White Rats infected with** *Plasmodium berghei*. *Exper. Parasit.* New York. 1954, May, v. 3, No. 3, 259–66, 1 fig. [15 refs.]

Mercado [this *Bulletin*, 1953, v. 50, 383] has already shown that there was a considerable fall in the blood sugar of rats infected with *P. berghei* when parasitaemia reached high levels. The study recorded here is concerned with glycogen levels in the livers of rats infected with *P. berghei* and the ability of that organ to effect its synthesis under certain conditions. Estimations were made at 3 stages of parasitaemia, namely, 0 to 20 per cent., 21 to 40 per cent., and above the last-named figure. For this purpose the animals were killed and livers removed as rapidly as possible. The amount of glycogen in liver and carcass was determined by a standard method. Experiments were arranged in such a way that in one group infected animals and controls received unrestricted amounts of food and in another the diet of the uninfected controls was restricted to the amount consumed by infected animals. In another experiment in which only the liver was analysed the animals received food *ad libitum* up to 24 hours before the experiment ended, and were starved for the final 24 hours. They were then killed immediately or given glucose either by stomach tube or intravenously and then killed at 3 or 1 hours interval thereafter respectively. The following is the authors' summary:—

"The liver glycogen of female white rats infected with *Plasmodium berghei* decreased progressively with increasing parasitemia while a decrease in the carcass glycogen became apparent only in highly parasitized animals. Experiments with controlled food intake proved that the loss in carcass glycogen can be fully accounted for by the reduced food intake of parasitized animals, but this factor explains only part of the loss in liver glycogen. A true disturbance of the liver function has to be assumed in addition to the effect of semi-starvation. This view is substantiated by the observation that parasitized animals deposited less liver glycogen than nonparasitized controls when given glucose either orally or intravenously." *J. D. Fulton*

Singer, I. **The Effect of Splenectomy or Phenylhydrazine on Infections with *Plasmodium berghei* in the White Mouse.** *J. Infect. Dis.* 1954, Mar.–Apr., v. 94, No. 2, 159–63, 2 figs. [12 refs.]

In the present investigations splenectomy of the mouse host was employed to reduce the amount of erythropoietic tissue and treatment with phenylhydrazine to cause the reverse effect, so that the results of each procedure on infections of *P. berghei* could be studied. Two days after splenectomy in one group of 10 animals, for which an equal number traumatized by unilateral nephrectomy served as controls, infection was produced by intravenous inoculation of 12·5 million parasites. Smears of tail blood for parasite, reticulocyte and erythrocyte counts were made daily. A single injection of phenylhydrazine or its acetyl derivative in dosage of 0·06 mgm. per gm. weight was given to each mouse 2 days before infection and produced various types of granulation in the red blood cells. Six days after infection the splenectomized animals consistently showed a lower degree of infection and fewer reticulocytes than controls, whether traumatized or not. In the drug-treated animals, on the other hand, a more intense parasitaemia and reticulocytosis occurred at this time. In neither case was survival time in this fatal infection significantly different in treated or control animals.

The results found by the present author are in agreement with those obtained previously in *P. relictum* infections of canaries and indicate the preference of *P. berghei* for the immature red cell, whose numbers control the degree of parasitaemia. *J. D. Fulton*

Singer, I. **The Effect of Cortisone on Infections with *Plasmodium berghei* in the White Mouse.** *J. Infect. Dis.* 1954, Mar.–Apr., v. 94, No. 2, 164–72, 3 text figs. & 8 figs. on pl. [14 refs.]

Publications by different authors [this *Bulletin*, 1952, v. 49, 237, 672] have indicated that cortisone produces an enhanced parasitaemia in various animals infected with plasmodia. In human cases the results were less clear cut [*ibid.*, 1953, v. 50, 87]. The present author finds that mice infected with *P. berghei* and treated with cortisone survive longer and have a lower parasitaemia than untreated controls. Essentially similar results have recently been noted by Roberts [this *Bulletin*, 1954, v. 51, 885]. The mice used were from an inbred strain and weighed approximately 20 gm. Parasite, reticulocyte and red cell counts were made daily. Starting 2 days before infection some mice were given 0·25 mgm. cortisone daily and treatment was continued throughout the infection. Others received 5·0 mgm. of the drug a few minutes before or some days after infection. More intensive treatment was given to further groups of mice which received 5·0 mgm. cortisone for 8 successive days starting 2 days before or 6 days after infection. A 50 per cent. mortality in the last-named groups occurred within 11 days.

The general inference was that the drug decreased both the parasitaemia and reticulocytosis which followed infection, and anaemia was also held in check. Examination indicated that fewer macrophages were present owing to decreased proliferation in the tissues concerned as the result of drug treatment, and that their phagocytic activity was probably increased. The reduced production of reticulocytes which serve as a suitable nidus for the parasite also served to limit parasitaemia. *J. D. Fulton.*

Porter, R. J., Laird, R. L. & Dusseau, Elizabeth M. **Studies on Malarial Sporozoites. II. Effect of Age and Dosage of Sporozoites on their Infectiousness.** *Exper. Parasit.* New York. 1954, May, v. 3, No. 3, 267–74, 4 figs.

Aëdes aegypti mosquitoes were infected with *Plasmodium gallinaceum*; they were kept at about 28°C. and fed on raisins or apples. The sporozoite suspension was prepared by cutting off the heads of the mosquitoes, squeezing the thorax into normal saline and suspending the emergent salivary glands (from about 10–20 mosquitoes) in 0·5 ml. of heparinized chick blood. The density was measured by counting the sporozoites against erythrocytes in stained films. Standard doses were then inoculated intravenously into 2 to 7-day-old chicks and the parasitaemia was determined on the sixth day after inoculation. Experiments showed that the degree of parasitaemia varied according to the number of sporozoites inoculated: 500,000 sporozoites gave a mean parasitaemia of 1,275; 50,000—177 parasites; 5,000—14 parasites; 500—2·2 parasites; 50—infection in half the birds; and with 5 or fewer sporozoites—no infection. All data were then converted to a single value—the number of parasitized erythrocytes per 10,000 on the sixth day, per million sporozoites inoculated; and it was shown how the infectivity of sporozoites declined according to the length of residence in the salivary glands—the standard parasitaemia was about 4,000 in the 2nd week after infection of the mosquito, about 1,000 on the 3rd week, 100 on the 4th week, and 10 or practically undetectable by the 5th week. Other experiments showed that the number of sporozoites also declined—falling about 90 per cent. in 4 weeks. *P. C. C. Garnham*

Manwell, R. D. **Blood Parasites of Birds of the High Rockies.** *J. Parasitology.* 1954, Apr., v. 40, No. 2, 229–31.

The blood of wild birds caught in the Rocky Mountains between altitudes of about 9,000 and 11,000 feet was examined for parasites. *Plasmodium cathemerium* was found once in the non-migratory Canada jay and *P. vaughani* once in a robin. *Leucocytozoon*, *Haemoproteus* and trypanosomes were discovered in nestling robins, and this finding indicates that the incubation period of all 3 parasites was not longer than 10 days, and that the vector was present in the locality. No dividing forms of trypanosomes were found in the blood or organs of the infected birds, nor was there any concentration of the organisms in the bone-marrow or lungs. Asexual development of *Leucocytozoon* was found in the kidneys of robins. Trypanosomes also occurred in the Lincoln, white-crowned, and white-throated sparrows.
P. C. C. Garnham

Heisch, R. B. **Presence of "*Plasmodium*" *brodeni* in Elephant Shrews (*Elephantulus* sp.). From the Kitui District, Kenya Colony.** *East African Med. J.* 1954, June, v. 31, No. 6, 263–4.

The author, from Kenya, refers to the report by Hoogstraal *et al.* on *Plasmodium brodeni* found in an *Elephantulus* shrew in south-eastern Sudan [this *Bulletin*, 1951, v. 48, 446].

The present author now reports the finding of what is believed to be the same parasite in *Elephantulus rufescens rufescens* from the northern part of Kitui District, Kenya Colony. Mature male and female gametocytes were found in the blood of 5 of 14 of these elephant shrews and they closely resembled those described by Hoogstraal *et al.*, but no immature forms were

found. The infection was mostly light, but the studies were made in the dry season (February): Hoogstraal *et al.* had noted a marked seasonal incidence, with up to 100 per cent. of infections at the height of the rains (August). *H. J. O'D. Burke-Gaffney*

TRYPANOSOMIASIS

In this section abstracts are arranged as far as possible in the following order:—African—*human, animal;* American—*Chagas's disease and other trypanosome infections. In each form the following order is followed*:—*epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.*

Gillet, J. La trypanosomiase humaine au Congo belge et au Ruanda-Urundi. [**Human Trypanosomiasis in the Belgian Congo and Ruanda-Urundi**] *Inst. Roy. Colonial Belge Bull. des Séances.* 1954, v. 25, No. 1, 326–58. [60 refs.]

A general review written in connexion with the nosological map to be published in the *Atlas Général du Congo.*

Tanganyika. Medical Department. **Sleeping Sickness Service Annual Report 1953.** 7 mimeographed pp. [1954.]

The 1953 report records a considerable increase over 1952 in the number of sleeping sickness cases, which is attributed to the hot, dry year. The major part of the increase occurred in the Western Province. In 1952 a focus had been discovered on the lake shore near the Ruanda-Urundi border, transmission being by *Glossina palpalis*, and mass treatment and bush clearance on the streams had been carried out. The results were unsatisfactory owing to the rapid regeneration of the vegetation, and mass prophylaxis with pentamidine isethionate has been instituted together with a search for fresh cases. It is reported that an outbreak in Ruanda-Urundi in 1944 was controlled when this chemo-prophylactic was used in 1946 and did not reapppear when the drug was stopped in 1952. The greatest increase in sleeping sickness was recorded in Tabora district where over 200 new cases were detected. These infections were not contracted in the settlements but on the rivers in the south-east of the district, to which an unusually large number of people had gone to fish and hunt because of the drought and food shortage.

Apart from the routine of survey and consolidation of control measures there has been little to report from the other provinces with the exception of the Southern Province. Here it is proposed to extend the railway from Nachingwea to Lumesule Juu, the latter being an old and still active focus of infection. The control measures proposed are an anti-tsetse clearing along the line west of Kilimarondo and the concentration of the scattered population into settlements near Kilimarondo and Lumesule Juu. In this province also a small outbreak of 13 cases was discovered 50 miles south of Masasi.

The more advanced cases of sleeping sickness in Tabora hospital during the year were treated with the new drugs. A surprising number returned regularly for re-examination, and valuable information concerning the results

of various drugs and courses of treatment is being accumulated. Further use of Mel B continues to support the view that it is valuable in advanced cases but unsuitable for dispensary use. Melarsen sodium has not been sufficiently tested but in the few cases treated it appeared to be comparable to Mel B or Arsobal. Pentamidine isetheonate has proved effective in very early *Trypanosoma rhodesiense* cases in daily doses of 200 mgm. intramuscularly for 5 days.

Following the observed correlation between the tsetse cycle in Shinyanga and the incidence of sleeping sickness in Tanganyika Territory, reported by Fairbairn [this *Bulletin*, 1948, v. 45, 1], it is believed that the 1953 increase in cases may be taken as the beginning of a rise which may reach its peak in 1956 or soon after. With this in view control has been made as efficient as possible with the available staff. *T. H. Davey*

de Azevedo, J. F. La lucha contra la enfermedad del sueño en el ultramar portugués. [**The Campaign against Sleeping Sickness in Portuguese Oversea Territories**] *Med. Colonial.* Madrid. 1954, May 1, v. 23, No. 5, 461–505, 27 figs.

This paper gives an account of trypanosomiasis in the Portuguese territories of Angola, Mozambique and Guinea. It reports for each territory on the incidence of the human disease and refers also to some extent to animal infections besides listing the species of tsetse fly which occur and indicating the known, or suspected, vectors of the trypanosomes. Mozambique, in which human cases are caused by *Trypanosoma rhodesiense*, provides the most serious and difficult problem in control. In Angola, control in recent years has been mainly by an intensive campaign of administering prophylactic pentamidine to the human population. The organization, which included mobile units, is described. Some partial clearings against *G. palpalis* were also made. Inspections and hospital treatment of infected persons, supplemented by some chemoprophylactic trials and clearings against tsetse fly, were the measures adopted in Guinea. In Mozambique, a more complex approach to control has been in force including various measures in the control of tsetse flies as well as control of infection in man and animals. Spectacular success has been obtained in Angola but not in Guinea nor, particularly, in Mozambique. The text of the paper contains a fair amount of numerical data and is amplified by charts and maps of disease and of distribution of tsetse flies. Some of these figures, more particularly the maps, are so reduced and poorly reproduced as to obscure completely much of the detailed information they contain.

D. S. Bertram

Lapeyssonnie, L. La réaction du formol-leuco-gel en pathologie exotique. [**The Formol-Leuco-Gel Reaction in Tropical Pathology**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 113–19, 1 chart.

The reaction of Gaté and Papacostas was performed on 1,456 sera in the following manner. Two drops of commercial (40 per cent.) formalin were added to 1 cc. of clear serum and the opacity and gelification were noted after 30 minutes and 24 hours. The reactions are described as strongly positive, positive or negative.

The reaction revealed supernormal values for *gamma*-globulin in a number of tropical diseases. Its use is in practice limited, if negative, to the exclusion of trypanosomiasis in the blood-lymphatic stage [the author presumably is thinking in terms of Africa]. *J. H. Birkinshaw*

Schneider, J. & Montézin, G. Étude de l'action trypanocide expérimentale (essais de chimioprophylaxie sur *T. brucei*, souche Pasteur) de la suramine, de la pentamidine et d'un sel de suramine/pentamidine. Note préliminaire. [**Study of the Trypanocidal Action (Prophylactic Experiments with the Pasteur Strain of *T. brucei*), of Suramin, Pentamidine and of a Salt of Suramin-Pentamidine. Preliminary Communication**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 249–54.

This report describes a preliminary investigation on the prophylactic properties of suramin (Bayer 205, Antrypol, Moranyl), pentamidine (lomidine) and a combination of the two against *T. brucei* infection of mice, since it was shown [this *Bulletin*, 1952, v. 49, 126] that suramin markedly lowered the toxicity of pentamidine for this host. The salt of pentamidine and suramin formed on mixing their solutions contains 35·7 per cent. of the former, 45·5 per cent. of the latter and 18·9 per cent. of water of crystallization. Results obtained in similar experiments to the present were described by Cosar *et al.* [this *Bulletin*, 1954, v. 51, 892].

The present authors have determined the maximum tolerated and minimum curative doses of each of the 2 substances, of the 2 substances given simultaneously but not mixed and finally of the salt with the composition given above. The experimental results are presented in a table and the conclusions drawn were that the greatly reduced toxicity of the salt allows very large doses to be given. It possesses curative as well as protective properties at dosage levels below those of its components. The authors believe that the use of this salt will be advantageous for the treatment of trypanosomiasis, in view of the more favourable results obtained in connexion with *T. brucei* infections in mice than with each substance given singly or both at the same time. *J. D. Fulton*

da Silva, T. L. Aspectos da epidemiologia e profilaxia da moléstia de Chagas no Estado de São Paulo. [**Aspects of Epidemiology and Prophylaxis of Chagas's Disease in the State of São Paulo**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1954, Mar., v. 19, No. 59, 3–6.

Chagas's disease is present in all the States of Brazil, but has been investigated particularly in Rio Grande do Sul, São Paulo and Minas Gerais, and it is a serious problem because the entire rural population is exposed to infection. In 285 of the 369 municipalities of São Paulo (77·2 per cent.: not 69·9 as stated) the transmitting insect, or patient, or the animal host, has been found infected. The transmitters belong to 3 genera: *Panstronglus* (*P. geniculatus*, *P. megistus*); *Rhodnius* (*R. domesticus*, *R. prolixus*); and *Triatoma* (*T. infestans*, *T. oswaldoi*, *T. rubrofasciata*, *T. tibiomaculata* and *T. sordida*). In 145, or more than half the municipalities, Triatomids infected with *T. cruzi* were found.

A table is given showing the numbers of insects captured, the numbers dissected and the numbers and percentages found infected. Of 134,759 *T. infestans* captured 69,828 were dissected and 6,664 were infected (9·5 per cent.); of 2,215 *T. sordida* captured 1,353 were dissected and 67 (4·9 per cent.) were infected; of 2,121 *P. megistus* captured 205 were dissected and 3 (1·4) were infected, and of 438 *Rhodnius* sp. captured 50 were dissected but only 1 was found infected. Altogether, of 139,533 captured 71,436 were dissected and 6,735 were found infected, 9·4 per cent. [In the table the totals have been wrongly calculated throughout.]

It will be seen that *Triatoma infestans* is by far the most important vector. The Machado-Guerreiro reaction has been tested on a large number

of subjects and the figures for 1951, 1952 and 1953 and the totals are given. In 1951, of 5,238 examined 800 (15·3 per cent.) were positive and another 359 (6·8 per cent.) were doubtful; in 1952, of 19,302 examined 2,157 (11·1) were positive; in 1953, of 16,275 examined 1,881 (11·6) were positive. Altogether in the 3 years, of 40,815 examined 4,838 (11·8 per cent.) were positive and 1,571 (3·8) were doubtful.

Insecticides DDT and BHC have been freely used. In 1951, 60 municipalities were sprayed with DDT, 18 with BHC and 19 with both these, 97 municipalities in all; in 1952, 26 were sprayed with DDT, 46 with BHC and 78 with both, 150 municipalities in all; up to October in 1953 only 19 were sprayed with DDT, 66 with BHC and 83 with both; in other words, in the first 10 months of 1953, 168 municipalities were treated. The author concludes by saying that if it were possible to spray 800,000 to a million houses annually, infection by *T. cruzi* would be eradicated from the State of São Paulo. *H. Harold Scott*

Corrêa, R. R. & de Lima, A. R. Nota sôbre o gênero *Rhodnius* Stal, 1859, no Estado de São Paulo, Brasil. [**Note on the Genus *Rhodnius* in São Paulo, Brazil.**] (Hemiptera, Reduviidae, Triatominae.) *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1953, Sept., v. 18, No. 57, 267–80, 19 figs. & 1 folding map on 9 pls.

The English summary appended to the paper is as follows:—

"The presence of two species of *Rhodnius* is shown in 17 counties (municípios) of the State of São Paulo, Brazil. *Rhodnius domesticus* occurs in three of them, situated on the lowlands, and *Rhodnius* sp. (very similar to *R. prolixus*) was found in 14 ones on the 'plateau'.

"The latter as well as *Triatoma infestans*, *Triatoma sordida* and *Panstrongylus megistus*, is considered vector of Chagas' disease in the State.

"It was caught naturally infected with *Trypanosoma cruzi* on the 'município' of São José do Rio Preto, São Paulo.

"Nymphs of *Rhodnius* sp. were experimentally infected with *T. cruzi* by sucking two men carriers of acute Chagas' disease infection.

"A taxonomic study was carried out to compare *Rhodnius* sp. with *Rhodnius prolixus* in all stages."

Ryckman, R. E. **A Method of collecting Large Quantities of Feces from Triatominae infected with** *Trypanosoma cruzi*. *J. Econom. Entom.* 1954, Feb., v. 47, No. 1, 170–71, 1 fig.

The usual method of collecting faeces of Triatominae infected with *Trypanosoma cruzi* by killing the bugs and removing the hind-gut contents has the obvious disadvantage that the faeces are usually contaminated with undigested blood. The author overcame this difficulty by using a plastic jar, open at both ends, and 10 cm. high and 9 cm. in diameter, for feeding the bugs and collecting the infective faeces. The top of the jar was closed by a piece of nylon stretched across a Mason screw cap band and held in place by adhesive tape. The bottom was covered with a standard Mason lid and screw cap band. A piece of blotting paper (on which the bugs can maintain a foothold) was fixed inside the jar and the bugs *Triatoma infestans* or *T. protracta* infected with *Trypanosoma cruzi* were released into it. The animal to be fed was strapped over the upper part of the jar. During feeding and immediately after feeding, therefore, the bugs faced upwards and the infective faeces falling straight to the bottom of the jar were

collected by removing the bottom lid. Added advantages of this method are that (1) the infected bugs are not sacrificed and can be used for repeated transmission studies; (2) uninfected laboratory animals do not get infected by the infected bugs feeding on them as the infective faeces drop to the bottom of the jar without contaminating the body of the animal.

This type of plastic jar, according to the author, can also be adapted to form a rearing unit for Triatominae. *M. G. R. Varma*

de Almeida, J. O., de Freitas, J. L. P. & Brandão, H. **Complement Fixation Test with a Triple Antigen for Syphilis, Tuberculosis, Leprosy or Chagas' Disease in Blood Banks.** *Amer. J. Trop. Med. & Hyg.* 1954, May, v. 3, No. 3, 490–94.

In some South American countries, in addition to syphilis, leprosy, American trypanosomiasis (Chagas's disease) and tuberculosis are endemic. Therefore a screen test to eliminate these diseases would be very useful in blood banks.

A " triple " antigen was made up of cardiolipin, *Trypanosoma cruzi* and *Mycobacterium tuberculosis* extract (which reacts with leprous and tuberculous sera) and used in a complement-fixation test (details in original) depending on 50 per cent. haemolysis of sensitized cells. It was found experimentally that sera from patients with any one of the above diseases reacted not only with their own specific antigen but also with the " triple " antigen and that there was no interference between the 3 antigen-antibody combinations.

A total of 786 sera were tested with " triple " antigen; 599 were negative and showed no reactivity with each separate antigen; 103 sera which reacted with any one specific antigen reacted also with the " triple " antigen. On the other hand, 76 sera reacted with " triple " antigen but not with any one of the single antigens; it is suggested that this was due to the cumulative effect of the 3 antigens on complement; 4 sera were anticomplementary. It is concluded that in countries where these diseases are prevalent a triple antigen should be used for screen testing, since there were no false negatives in the series tested. *T. E. Osmond*

Hartz, P. H. & Toledano, D. **Specific Orchitis in Chagas's Disease.** *Documenta Med. Geograph. et Trop.* Amsterdam. 1954, June, v. 6, No. 2, 124–30, 8 figs. [10 refs.]

The patient was a half-caste, aged 46, who had never been away from Táchira State, Venezuela. He was weak and obviously very ill when admitted to hospital, with blood pressure 100/80, pulse thin, 80 per minute; X-ray showed a distinctly enlarged heart; he died 2½ days after admission. The myocardial changes, which were typical of Chagas's disease, are to be recorded in another paper. The present deals only with the histology of the testicles. These showed a resemblance to diffuse granulomatous syphilitic orchitis, but the important point was atrophy of the seminal tubules with leishmanial forms of *T. cruzi* in them and in the Sertoli cells. This is said to be the first recorded instance of this condition, but cases have probably been overlooked, partly because Chagas's disease is commonest in rural districts where there are no pathologists and microscopical examination of the testicles has, therefore, not been carried out; in fact, autopsies on patients dying of Chagas's disease in these country districts are rare, and when they are made attention is chiefly paid to the cardiac lesions. This article contains some excellent photomicrographs. *H. Harold Scott*

Coutinho, J. O. & Nussenzweig, V. Infecção experimental de triatomíneos pelo *Trypanosoma rangeli* Tejera, 1920. [**Experimental Infection of Triatomids with** *Trypanosoma rangeli*] *Folia Clin. et Biol.* S. Paulo. 1952, Dec., v. 18, No. 3, 181–8, 10 figs. [18 refs.]

Experiments described in this paper were carried out in order to determine whether *Trypanosoma rangeli* was capable of developing in Triatomid bugs occurring in Brazil.

In one series of experiments cultures of a Venezuelan strain of *T. rangeli* were inoculated into the haemocoele of the nymphs of *Rhodnius prolixus, Triatoma infestans, T. vitticeps* and *Panstrongylus megistus*. All, except the last-named species, became infected, with free trypanosomes and crithidia in the coelomic cavity and rounded flagellates within the host cells. When bug's faeces were inoculated into the body cavity, these cells ingested faecal débris and bacteria, showing that they were phagocytes. Nevertheless, the authors regard the intracellular forms of the trypanosomes as developmental stages. Neither the faeces nor the saliva of the infected bugs revealed the presence of flagellates.

In another series of experiments, nymphs of the same species of bugs were induced to feed on cultures of *T. rangeli* mixed with human blood. An intestinal infection resulted in all 4 species, but no flagellates were seen in the haemolymph. Material obtained from the hindgut of the infected bugs was inoculated intraperitoneally and subcutaneously into young rats and pups, in both cases with negative results. When inoculated into the haemocoele of other bugs, these faeces again produced infections.

From the successful infection of local bugs it is concluded that *T. rangeli* might be encountered naturally in the absence of its true vector, *Rhodnius prolixus*. In view of this, it is important to be able to identify the species of trypanosomes found in the faeces of various Triatomid bugs. The ease with which *T. rangeli* develops in the body cavity of various bugs affords a method for differentiating it from *T. cruzi*. *C. A. Hoare*

LEISHMANIASIS

In this section abstracts are arranged as far as possible in the following order:—visceral, cutaneous, muco-cutaneous.

See also p. 1115, Lewis & Kirk, **Notes on the Phlebotominae of the Anglo-Egyptian Sudan.**

Biagi F., F. & de Buen de Biagi, Ana M. Datos ecológicos de algunos flebotomus mexicanos (Diptera, Psych.). [**Ecological Observations on Some Species of** *Phlebotomus* **in Mexico**] *An. Inst. Biol.* Mexico. 1953, v. 24, No. 2, 445–50.

Phlebotomus cruciatus, P. panamensis, and *P. shannoni* are common man-biting sandflies in parts of Mexico where cutaneous leishmaniasis is endemic. They are woodland species most abundant in the rains, being few in number in the dry season from April to June. They bite in the early hours of the night and in greatest numbers near vegetation, particularly if temperatures are between 20° and 26°C. and relative humidity is less than 90 per cent. *D. S. Bertram*

Singh, M. & Sur, M. L. **Non-Ulcerating Nodular Type of Cutaneous Leishmaniasis.** *J. Indian Med. Ass.* 1954, June, v. 23, No. 9, 400–403, 4 figs. (3 on pl.).

"1. A case of non-ulcerating type of cutaneous leishmaniasis has been described, giving the detailed history, clinical picture, and the laboratory investigations.

"2. In the discussion, the *L. tropica* lesions as they occur in different parts of the world have been reviewed. In view of the fact that the morphological, cultural, and antigenic characters are of poor value in the differentiation or the identity of the unknown species, differentiation of leishmanias depends chiefly on the clinical picture of the patient and it was concluded that the lesions noted in this case were caused by *L. tropica*.

"3. It has been further brought out that this case is an unusual dry type of cutaneous leishmaniasis caused by the *L. tropica*, which resembles the dry cutaneous leishmaniasis of Russian workers [this *Bulletin*, 1943, v. 40, 296]."

FEVERS OF THE TYPHUS GROUP

In this section abstracts are arranged as far as possible in the following order:—general; louse-borne typhus, flea-borne typhus, mite-borne typhus; rickettsialpox; tick-borne typhus; Q fever, other rickettsial diseases.

Allen, Emma G., Bovarnick, Marianna R. & Snyder, J. C. **The Effect of Irradiation with Ultraviolet Light on various Properties of Typhus Rickettsiae.** *J. Bacteriology.* 1954, June, v. 67, No. 6, 718–23, 1 fig. [15 refs.]

Partly purified suspensions of yolk-sac cultures of *Rickettsia prowazeki* were exposed to various doses of ultraviolet irradiation. After short exposures there was a very great reduction in the infectivity of the suspensions for chick embryos and cotton rats. For example, in one experiment the infectivity for chick embryos was reduced by an exposure of one minute from 100 per cent. to 0·001 per cent. The reduction in toxicity was only from 100 per cent. to 50 per cent. and the reduction in haemolytic activity was only to 60 per cent. There was also a relatively slight reduction in the respiratory activity of the rickettsiae. After irradiation prolonged to 9 minutes the toxicity was reduced to 8 per cent., the haemolytic action to 21 per cent. and the respiratory activity to 62 per cent.

John W. D. Megaw

Snyder, J. C., Bovarnick, Marianna R., Miller, Judith C. & Chang, R. Shih-man. **Observations on the Hemolytic Properties of Typhus Rickettsiae.** *J. Bacteriology.* 1954, June, v. 67, No. 6, 724–30, 1 fig. [12 refs.]

The authors have devised a standard method of determining the haemolytic activity of washed rickettsial suspensions; they have called it the "short haemolytic test". They have used the method in experiments with various rickettsiae to find the relationship between their toxicity for mice

and their haemolytic activity. Two strains of *Rickettsiae prowazeki* and one of *R. mooseri* were examined and 83 comparisons were made with 7 different rickettsial preparations. The test was found to give results comparable with those obtained in the titration of the toxicity of the rickettsiae by intravenous inoculation of white mice. It was considered that in certain conditions the method would have advantages over the mouse-toxicity test.

In the course of an extensive study of the influence of various substances on the haemolytic activity of the rickettsiae it was found that aureomycin and oxytetracycline reduced this activity but chloramphenicol had no such effect. *John W. D. Megaw*

Mattern, P. Variations du taux des polynucléaires éosinophiles chez des sujets sensibilisés aux antigènes rickettsiens après injection intradermique d'une suspension formolée de *Rickettsia prowazeki*. [**Variations in the Polynuclear Eosinophile Counts after Intradermal Injections of a Formolized Suspension of** *Rickettsia prowazeki* **among Persons who are Sensitized to Rickettsial Antigens**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 231–4.

The author found that among 5 healthy persons who had no history of previous rickettsial infection suitable doses of formolized suspension of *Rickettsia prowazeki* given intradermally caused neither any obvious reaction nor any significant change in the polynuclear eosinophile count.

Similar injections were given to 6 persons who had been handling *R. prowazeki* and other rickettsiae for many years and whose sera contained abundant antirickettsial agglutinins, especially for *R. prowazeki*. In 5 of these persons the injections caused intense local reaction which reached its maximum after 24–48 hours and was accompanied by a simultaneous reduction in the polynuclear eosinophiles by 64–92 per cent. In the 6th person the cutaneous reaction was moderate and the eosinophiles were increased by 114 per cent. after 48 hours.

In a person who was injected 3 months after having had an attack of exanthematic fever following a bite by a tick in Indo-China the cutaneous reaction was very intense and the eosinophiles were reduced by 71 per cent. 24 hours after the injection. In another case there was a history of fever of doubtful nature 2 years previously in Bamoko and the serum agglutinated *R. prowazeki* and *R. conori* at 1 in 160, the cutaneous reaction was moderate in intensity and the eosinophiles were increased by 90 per cent. after 48 hours. In a third case there was a history suggestive of louse-borne typhus 10 years previously but the agglutination test was negative. The cutaneous reaction was very intense and the eosinophile count was increased by 116 per cent. after 24 hours and by 258 per cent. after 48 hours.

The author suggests that further study should be made of the eosinophilic and eosinopenic reactions among persons known to have had previous attacks of typhus-group fevers. *John W. D. Megaw*

Mathur, T. N. **Murine Typhus in Villages of Punjab.** *J. Indian Med. Ass.* 1954, June, v. 23, No. 9, 409–10, 2 figs.

The author has already reported the occurrence of 4 cases of murine typhus in Karnal town in 1951 [see this *Bulletin*, 1954, v. 51, 682]. He now reports 2 more cases occurring in villages in the same region in February 1954. In one case the diagnosis was based on the occurrence of an attack of remittent fever lasting 14 days and a Weil-Felix reaction with

Proteus OX19 rising from 1 in 125 on the 10th day to 1 in 2,500 on the 14th day; the *OX2* reactions on the corresponding days were at 1 in 83 and 1 in 833 and the *OXK* reactions were at 1 in 125 and 1 in 50; there was no rash. In the other case there was a generalized papular rash followed by desquamation and the persistence of brownish-black spots till at least the 20th day. On the 11th and 18th days the *OX2* and *OX19* titres were 1 in 125; by the 40th day they had fallen to 1 in 83. The serum was examined with the complement-fixation test; the titre with murine typhus antigen rose from 1 in 8 to 1 in 16; there was " no fixation with the antigen of tick typhus ". The fixation test was done by Col. S. L. Kalra; apart from it the diagnosis of tick-borne typhus would have seemed the more likely in this case. *John W. D. Megaw*

Smith, W. W. **The House Mouse and Murine Typhus in Mississippi.** *Pub. Health Rep.* Wash. 1954, June, v. 69, No. 6, 591–3, 1 map.

" Mississippi is one of the southeastern States in which murine typhus is endemic. A peak of human cases (235) was reported in 1945—the disease had been present and had increased since 1933. The great decrease in the number of cases since 1945 is believed due chiefly to the DDT dusting campaigns conducted by the Mississippi State Board of Health, the Public Health Service, and the cities and counties in the southern part of the State. The wide distribution of the house mouse and its close association with man suggested the desirability of evaluating its importance as a reservoir of murine typhus. A survey in which 294 pools of blood serums from 995 house mice were obtained showed only 1 positive for the antibodies of murine typhus. The positive pool was obtained from serums of 2 mice taken from a barn known to have harbored typhus-positive domestic rats recently. It was the only positive serum of 7 pools taken from such infected premises and could indicate that the house mouse is more likely to be infected where its range is overlapped by that of infected domestic rats. The importance of the house mouse in the epidemiology of murine typhus in Mississippi appears to be negligible at present."

Giroud, P. & Ciaccio, G. Anticorps et réactions locales provoquées chez le lapin infecté de rickettsies murines et traité en même temps par la terramycine. [**The Antibodies and Local Reactions produced in Rabbits when infected with Murine Rickettsiae and treated simultaneously with Oxytetracycline**] *C.R. Soc. Biol.* 1954, Feb., v. 148, Nos. 3/4, 274–6.

Experiments are described in which rabbits were given intradermal injections of varied doses of living murine typhus rickettsiae and some of the animals were treated with oxytetracycline from the day of injection.

The treatment caused a very great reduction in the local reaction and in the production of rickettsia-agglutinating antibodies. Although the results obtained varied greatly in accordance with the differences in the doses of rickettsiae it was possible in some cases to obtain a considerable degree of antibody production with doses that caused no pronounced local reaction.

In some of the experiments estimations were made of the neutralizing-antibody content of the sera of the treated rabbits and this was found to be pronounced. *John W. D. Megaw*

Mathur, T. N. & Datta, K. N. **The Occurrence of Scrub Typhus in Karnal District.** *J. Indian Med. Ass.* 1954, June, v. 23, No. 9, 375–8, 3 figs.

Two cases of scrub typhus have already been described by Mathur and Suri as occurring in the Karnal District of the Punjab (India) [see this *Bulletin*, 1954, v. 51, 683]. Four more are now described from the same district; in 3 of them *Proteus OXK* was agglutinated at titres rising to 1 in 250 or 1 in 500; in the 4th the highest titre observed was 1 in 83 and at the same time *Pr. OX2* was agglutinated at 1 in 50 so that in this case the serological evidence is not convincing. *John W. D. Megaw*

Soman, D. W. **Tsutsugamushi Disease (Scrub Typhus) in Bombay City and Suburbs.** *J. Indian Med. Ass.* 1954, June, v. 23, No. 9, 389–94. [20 refs.]

During the 8 years, 1945–52, sera of 19,958 patients sent for Widal tests to the Haffkine Institute, Bombay, were examined by the Weil-Felix test. Of these 886 reacted with *Proteus OX* strains; 776 of the positive sera were classified as belonging to the *OX19* type, 20 as of the *OX2* type and 90 as of the *OXK* type.

Rickettsia orientalis [*tsutsugamushi*] was isolated from a patient in Bombay in 1945 by Savoor *et al.* [this *Bulletin*, 1948, v. 45, 781], and the author now describes the isolation of 21 further strains from sera of the 80 patients who gave reactions of the *OXK* type during the years 1946–1952. In 1946 the organism was recovered from 8 of the 15 reactors with *OXK*. In 1947 one strain was recovered from 11 reactors; in 1948 5 strains from 7 reactors; in 1949 there were 5 strains from 18 reactors; in 1950 2 strains were recovered from 20 reactors, and in the next two years no strain was recovered from 9 reactors. The great decline during recent years in the number of *OXK* reactors and in the isolation of strains of *R. tsutsugamushi* is attributed to improved sanitation in Bombay city and to the prompt use of chloromycetin in the treatment of continued fevers.

From 1,442 rats collected at random from different localities in Bombay at different seasons during the years 1947–1948, 3,302 mites were collected from the 192 rats found infested. Mice were inoculated with suspensions of 16 pools of 40–200 mites, about 1,500 in all, but no infection resulted. The mites belonged to 3 species of *Trombiculae* but no *T. deliensis* was found.

Hardly any ticks were found on the rats and the " very few " fleas that were collected were mostly *Xenopsylla cheopis*.

Surprise is expressed at the occurrence of scrub typhus in an urban area like Bombay city but it seems likely that if the homes and places of work of the patients had been investigated it might have been found that conditions were favourable for contact between the human and mite populations. *John W. D. Megaw*

Pellissier, A. Fièvre rouge congolaise et rickettsioses en Afrique Équatoriale Française. [**Congolese Red Fever and Rickettsioses in French Equatorial Africa**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 310–20. [36 refs.]

The author defines Congolese red fever as a benign exanthematic fever accompanied by adenopathies and an inoculation chancre; serologically it belongs to the boutonneuse-spotted-fever group but it is neither of these diseases nor tick-bite fever. After referring to the conflicting opinions with

regard to the condition he apostrophizes his readers in the following terms: "Confusion reigns, LEGENDRE refuses to see in it anything but dengue, JADIN sees it as murine typhus, JADIN and HOOGE see it as historic typhus, and quite recently Le GAC and GIROUD have come to regard it as Q fever. Come now, gentlemen, be reasonable! for in spite of all this there really is a benign exanthematic fever which is Congolese red fever" [abstracter's translation].

The evidence produced by the author in support of this assertion is as follows. Among 7 attempts to isolate a rickettsia from the blood of patients 4 were successful in yielding a few (intracellular) rickettsiae after 2, 3, 4, and 5 passages respectively, but in spite of variations of the temperature of cultivation between 32° and 38°C. a rich culture could not be obtained by yolk-sac inoculation and the pathogenic power of the organism remained excessively feeble for guineapigs and chick embryos.

By examination of 163 sera from 98 patients a diagnosis of murine typhus was made in 5 cases and of Congolese red fever in 93. Details of the tests are not given except for 2 examples of the results obtained for each disease. In the murine typhus cases the complement-fixation and rickettsia-agglutination tests strongly supported the diagnosis but under the heading "Agglutination" there is an entry "RC—1/320" in each case; this presumably refers to agglutination of the rickettsiae isolated from a case diagnosed as Congolese red fever and if so the finding is puzzling because the highest "RC" agglutination titres of the 2 sample cases of Congolese red fever are shown as 1/320 and 1/160 and therefore not so high on the average as in the cases diagnosed as murine typhus. The other agglutination titres in the Congolese fever cases were, (1) with rickettsiae of Rocky Mountain spotted fever 1 in 320 and 1 in 160, (2) with tick-bite fever rickettsiae 1 in 640 and 1 in 320. No complement-fixation tests were done with Congolese fever or tick-bite fever antigens but only with Rocky Mountain fever antigen and with this the highest titre was 1 in 16 in one case and 1 in 32 in the other. The author's comments on these findings will cause some surprise, they are: "These results show indubitably that Congolese red fever is a rickettsiosis of the boutonneuse-spotted-tick-bite fever group but that it is neither one nor other of these infections and that it continues to deserve its autonomy" [abstracter's translation].

The author includes a short statement of his findings in a serological survey of unselected Africans from different parts of French Equatorial Africa. Among 814 sera tested only 6 (0·7 per cent.) gave positive complement-fixation reactions for Q fever at titres of 1 in 4 or over. Among 651 sera from the same area 2 were positive with historic typhus antigen, 5 with murine typhus antigen and 35 with Rocky Mountain spotted fever antigen.

In the light of these findings astonishment is expressed at the recent reports by GIROUD *et al.* [this *Bulletin*, 1951, v. 48, 626; 1952, v. 49, 1106], who found evidence of recent Q fever infection in about 10 per cent. of Africans and detected agglutinating antibodies of historic typhus in 74 out of 128 healthy cattle and other animals. *John W. D. Megaw*

WEYER, F. Beobachtungen an einem Stamm von südafrikanischem Zeckenbissfieber (South African Tick-Bite Fever). [**Study of a Strain of South African Tick Bite Fever**] *Ztschr. f. Tropenmed. u. Parasit.* Stuttgart. 1954, Apr., v. 5, No. 2, 205–18, 5 figs. [15 refs.]

The author describes a study of a strain of South African tick-bite fever rickettsiae which he obtained from Dr. J. H. S. GEAR. It was passaged

several times through mice by intranasal or intraperitoneal inoculation. Lice were readily infected by allowing them to feed on infected mice or by intrarectal or intracoelomic inoculation with infected material. The organism differed from *Rickettsia conori* in being much less lethal to lice in which little damage was done to the epithelial cells of the stomach and death seldom followed inoculation. The author states that the biological differences between the 2 organisms are enough to suggest that the name *R. conori* may not be suitable for the rickettsiae of tick bite fever.

Confusion would be avoided if the rickettsiae of all the tick-borne typhus-like fevers were provisionally classified as varieties of *R. rickettsi* and if the fevers themselves were provisionally named varieties of tick-borne typhus.

John W. D. Megaw

Babudieri, B. & Paolucci, S. Studio di un episodio epidemico di febbre Q, manifestatosi a S. Lorenzo in Campo (Pesaro). [**Study of an Epidemic Outbreak of Q Fever occurring at San Lorenzo in Campo (Pesaro)**] *Rendiconti Istituto Superiore di Sanità.* Rome. 1954, v. 17, Pt. 5, 404–17, 2 figs. [23 refs.] English summary.

The authors describe an explosive outbreak of Q fever in which more than 200 cases occurred within the last 3 weeks of November 1950 in a small town with a population of about 4,200. Infection was definitely traced to a flock of 20 sheep kept every night in a shed in a courtyard in the built-up area of the town. A few days before the onset of the outbreak 7 or 8 of the sheep gave birth to lambs and one of them aborted.

At this time there was a spell of drought, and dust was blown about by the high winds that occurred. All the sheep of the flock gave positive complement-fixation reactions for Q fever, most of them at high titres.

Among 76 patients tested by the complement-fixation reaction or by rickettsia agglutination 44 reacted definitely and 2 were doubtfully positive. Some of the negative reactions were probably due to mistaken diagnosis, others to the test having been made too early, and others to its being made 2 years after the outbreak. The heaviest incidence was in houses near the stable in which the sheep were housed or along the 2 streets along which the sheep travelled daily to their pasture grounds. Among the serologically confirmed cases 60 per cent. were males and 40 per cent. were females. Age was not an important factor except that there was a high incidence among children under the age of 5, and it was possible that some of these were suffering from febrile catarrh. Persons of every occupation were attacked, though a specially high incidence occurred only among those who were in close contact with the sheep. The fatality rate was 1·1 per cent. There was no evidence of transmission from person to person. Although 132 patients were treated with aureomycin and 11 with chloramphenicol the conditions were such that no reliable judgment could be formed with regard to the efficacy of the drugs.

John W. D. Megaw

Germer, W. D. Das Q-Fieber beim Meerschweinchen. Ein Beitrag zur allgemeinen Infektionslehre bei einem nur intracellulär gedeihenden Erreger. [**Q Fever in Guineapigs. A Contribution to Knowledge of a General Infection by a Strictly Intracellular Organism**] *Arch. f.d. gesamte Virusforschung.* 1954, v. 5, No. 4, 336–44, 4 figs. [22 refs.]

The author describes his findings in a detailed investigation of the clinical, serological and structural changes observed in guineapigs inoculated

with *Rickettsia burneti*. In the clinical and serological studies 97 guineapigs were inoculated with infected material from guineapigs or yolk-sac cultures. The Nine-Mile strain was employed in most of the experiments. The reactions were very uniform irrespective of the strain that was used. The incubation period was usually within the range of 4 to 7 days, the fever lasted 2 to 10 days; only 2 of the animals remained free from fever, and 22 of them died. Rickettsaemia usually persisted after defervescence, sometimes as long as 18 days. The complement-fixation titre rose to 1 in 16 or over by the 4th to the 8th day of the fever and reached the maximum, which averaged 1 in 750, about the 25th day. There was still a significant titre for a long time; the average after 7 months was 1 in 32.

The spleen was greatly enlarged at the height of the fever; there was fibrinous perisplenitis; scattered patches of consolidation often occurred in the lungs. The affected organs became normal about 30 to 40 days after infection. The chief microscopical changes were found in the spleen and testicles. Two days after infection proliferation of the reticulocytes of the spleen began to occur; at first this was diffuse but soon it tended to be localized in scattered nodules. Oedema of the spleen pulp was pronounced at the height of the proliferation and about the 16th or 18th day the fluid contained proliferated cells and leucocytes. The spermatogenous cells of the testicles became temporarily degenerated but they usually returned to normal within 30 to 40 days. The only pronounced difference between the findings and those observed in other rickettsial fevers was the absence of generalized vasculitis and perivasculitis. The author suggests that in view of the organism's being a filter passer and of its greater resistance to heat and certain chemicals there are grounds for transferring it to a new genus *Coxiella*. *John W. D. Megaw*

Hoenig, W. & Mohr, W. Zur Dauer des Wolhynischen Fiebers. [**The Duration of Trench Fever**] *Med. Klin.* 1954, June 25, v. 49, No. 26, 1034–7.

A case is described in which the rickettsiae of trench fever were detected in a person by the louse-feeding test (xenodiagnosis) 10 years after the presumably original attack and 3½ years after his departure from a region in which reinfection was possible. There was a history of numerous illnesses suggestive of recrudescences of the disease since the onset in January 1942.

On 24th October 1950 the patient was admitted to hospital; trench fever was suspected and in a xenodiagnostic test 13 of the 40 lice which had fed on the patient became infected. A second test after defervescence was also positive. The patient was then given a course of treatment with aureomycin in daily doses of 2·0 gm. for 5 days from 22nd November. Six days after the first dose the test was negative and a few days later the patient was discharged, free from symptoms. Later tests were made in February, August and November 1953, with negative results. *John W. D. Megaw*

YELLOW FEVER

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, transmission, pathology, diagnosis, clinical findings, treatment, control.

Polson, A. **Particle Size of Yellow Fever Virus.** *Proc. Soc. Exper. Biol. & Med.* 1954, Apr., v. 85, No. 4, 613–15, 1 fig.

The author has determined the particle size of the 17D strain of yellow fever virus by means of the Spinco preparative ultracentrifuge method (*Biochem. et Biophys. Acta.*, 1953, v. 11, 199), coupled with biological assay.

The technique and the method of calculating the sedimentation constant are described in detail.

The particle size was determined as ranging from 29·2 mμ. to 31·4 mμ. The size is thus nearer to that found by Bauer and Hughes [this *Bulletin*, 1935, v. 32, 593] than to that recorded by Pickels and Bauer [*ibid.*, 1941, v. 38, 69]. *H. J. O'D. Burke-Gaffney*

Bejarano, J. F. R. Posición de nuestra fauna mamalógica con relación a la fiebre amarilla transmitida por culícidos no domésticos. [**The Relation of South American Mammals to Yellow Fever transmitted by Non-Domiciliary Mosquitoes**] *Asoc. Argentina Para Estudio Enfermedades Transmisibles. Actas y Trabajos.* 1953, Oct., v. 2, No. 4, 9–17.

Three tables show serological results in a large number of species.

Bejarano, J. F. R. Culícidos no domésticos posibles transmisores del virus amarílico en la República Argentina. [**Non-Domestic Mosquitoes potentially capable of transmitting Yellow Fever in Argentina**] *Asoc. Argentina Para Estudio Enfermedades Transmisibles. Actas y Trabajos.* 1953, July, v. 2, No. 3, 13–18, 3 figs. [18 refs.]

The author presents a summary of what has already been recorded about the biology, geographical distribution and taxonomy of certain mosquitoes of the genera *Haemagogus* and *Aëdes* which have been shown in parts of South America to be capable of the experimental transmission of the virus of yellow fever.

A list is given of these and the other mosquitoes which have been investigated, and their efficiency as transmitters of the virus is compared with that of *Aëdes aegypti*; the species present in Argentina are indicated.

Thumb-nail sketch maps of northern Argentina show the geographical distribution in that country of the following 7 species:—*Haemagogus capricorni, spegazzinii, uriartei* and *equinus*; *Aëdes leucocelaenus, scapularis* and *fluviatilis*. *H. S. Leeson*

Courtois, G. Durée de l'immunité après vaccination antiamarile. [**Duration of Immunity after Yellow Fever Vaccination**] *Ann. Soc. Belge de Méd. Trop.* 1954, Jan. 28, v. 34, No. 1, 9–12.

The following is a translation of the author's summary:—

Twelve years after yellow fever vaccination, immunity could be demonstrated in 96 per cent. of those vaccinated.

It is suggested that the period of validity for certificates of yellow fever vaccination be extended to 9 years.

Study of natural immunity to yellow fever in children born after the vaccination period and comparison with results obtained in children from a non-vaccinated village appear to demonstrate that man probably plays a part in maintaining yellow fever endemicity in savanna country.

H. J. O'D. Burke-Gaffney

Pinto Severo, O. & Gutiérrez, R. I. Bases técnicas y normas de evaluación de la campaña contra el *Aedes aegypti*. [**Technical Bases and Standards for evaluating Campaigns against the** *Aedes aegypti*] *Bol. Oficina Sanitaria Panamericana*. 1954, May, v. 36, No. 5, 537–57. English summary.

[A useful presentation of the technical and administrative aspects of *Aëdes aegypti* control.]

DENGUE AND ALLIED FEVERS

Angrisani, V. Di una epidemia di dengue insorta a Bender Cassim (sul litorale africano del Golfo di Aden). [**Dengue Epidemic at Bender Cassim (on the African Coast of the Gulf of Aden)**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Jan., v. 35, No. 1, 11–25. English summary.

This epidemic occurred in February–March 1952, lasted 30 days and involved 97 persons. It hit the eastern, which is the poorest, quarter of the town where the people dwell in daub-and-wattle huts and have a low standard of living. The diagnosis was missed in the first 10 cases spread over the first 5 days. A rash was first noticed on the sixth day of the outbreak and followed a 24 hours' remission of the fever. The rash was particularly to be seen on knees, ankles and elbows, but spread later in many cases to the whole body except the face, and was followed by a second rise of temperature.

The paper analyses each sign and symptom as observed in this outbreak. A characteristic roughness of the skin, preceded by itching and followed by desquamation, is helpful in diagnosis. The spleen showed some enlargement in practically every case. The course of the disease in each patient varied between 6 and 11 days. Four patients developed jaundice. Six children died, 4 from bronchopneumonia. Six patients showed a third, and 4 a fourth, peak on the temperature chart.

Diagnosis is mainly based on the character of the rash, a benign course, and certain associated signs and symptoms, which are secondary but typical.

J. Cauchi

Hotta, S. **Experiments of Active Immunization against Dengue with Mouse-Passaged Unmodified Virus.** *Acta Tropica*. Basle. 1954, v. 11, No. 2, 97–104.

The author found that mouse-passaged unmodified dengue virus inactivated by formalin was protective for white mice, but when treated by ox bile it conferred very little immunity on them. Tests on human volunteers gave different results; formolized vaccines were inactive but bile-treated vaccines were protective to some degree, though in so irregular a manner

that they cannot be recommended for general use without further investigation. In one of the 4 volunteers inoculated with ox-bile vaccine a challenge dose of unmodified virus caused a reaction suggestive of a mild attack of dengue so that it seemed possible that the virus had not been completely attenuated. [See also this *Bulletin*, 1952, v. 49, 687.]

John W. D. Megaw

RABIES

Stenczel, J. Tollwut im Bayerischen Wald. [**Rabies in the Bavarian Forest** (*Wald*) **District**] *Öffentl. Gesundheitsdienst.* Stuttgart. 1954, June, v. 16, No. 3, 94–8.

Rabies broke out in foxes in Bavaria in March 1951 and there can be no doubt that it was introduced from Czechoslovakia and Austria. It spread to dogs and cats and other animals. In 1951 and 1952 rabies infection was proved to be present in 235 animals out of about 580 examined. The organization set up for the prophylactic inoculation of human beings is described, as also is the procedure for administration of the Hempt vaccine (killed *virus fixe*). A total of 163 persons were inoculated during 1951 and 1952. No death is recorded as having occurred among these persons, not even in the group of 78 bitten by animals proved by laboratory examinations to have been infected. *M. E. Delafield*

Kough, R. H. **Attack on a Human Being by a Rabid Insectivorous Bat.** *J. Amer. Med. Ass.* 1954, May 29, v. 155, No. 5, 441.

This is another account of the case in Pennsylvania referred to in this *Bulletin*, 1954, v. 51, 686. *H. J. O'D. Burke-Gaffney*

Málaga-Alba, A. **Vampire Bat as a Carrier of Rabies.** *Amer. J. Pub. Health.* 1954, July, v. 44, No. 7, 909–18, 4 figs. [40 refs.]

A general review and discussion.

Moulton, J. E. **A Histochemical Study of the Negri Bodies of Rabies.** *Amer. J. Path.* 1954, May–June, v. 30, No. 3, 533–43, 15 figs. on 2 pls. [30 refs.]

In this paper the author gives the results of his detailed histochemical study of Negri bodies in skunk brain infected with rabies and of his study of the physical characteristics of these inclusion bodies isolated from host cells by the technique of homogenization-centrifugation in sucrose.

In an attempt to ascertain more precise information on the chemical structure of the Negri body, the author applied, in all, 25 different histochemical methods; a table in the text lists these several methods, the particular substances investigated, and the results obtained. From these results it appears that Negri bodies showed positive reactions for protein, arginine, tyrosine, and *alpha* amino acids; that the inner granules of Negri bodies reacted positively for deoxyribonucleic acid and organic iron; that inconclusive results followed the staining of Negri bodies by the periodic-acid-Schiff method for polysaccharide complexes; and that negative staining results were obtained for ribonucleic acid, glycogen, hyaluronic acid, mucopolysaccharides, ascorbic acid, neutral fats, phospholipids, cholesterol,

inorganic iron, calcium, alkaline phosphatase, dehydrogenase, and cytochrome oxidase—for the two last-named, in both frozen-dried skunk brain and fresh mouse brain infected with rabies.

Homogenization-centrifugation in sucrose proved successful in isolating many Negri bodies from host cells, the inclusion bodies together with isolated nuclei forming a grey button at the bottom of the centrifuge tube. These Negri bodies showed no perceptible changes in structure or staining properties. When homogenization or centrifugation was prolonged, Negri bodies and nuclei became fragmented. Isolated Negri bodies could be identified by definite, refractile limiting membranes, coarse and refractile inner granules, and semi-opaque ground substance; isolated nuclei showed less conspicuous limiting membranes, finer granulation, greater transparency, and the presence of nucleoli. Isolated Negri bodies tended to settle more rapidly than nuclei in a drop of saline solution. When dilute Janus green B stain was pipetted into the drop of saline solution, the Negri body inner granules took up the stain before the ground substance. In 1 per cent. solutions of trypsin and pancreatin, inclusion sediment showed lysis of Negri bodies and nuclei at approximately the same time. *G. Stuart*

Andō, K., Ishii, K., Oka, Y., Irisawa, J., Shimada, K., Kato, T. & Murakami, H. **Studies on the Immunological Diagnosis of the Animals suspected of Rabies (Second Report).** *Japanese J. Med. Sci. & Biol.* 1953, Dec., v. 6, No. 6, 659–66, 1 fig.

In a previous paper [this *Bulletin*, 1954, v. 51, 686] the authors gave details of a new complement-fixation test for the diagnosis of rabies in animals suspected of that disease, and claimed that for diagnostic purposes the new test was of greater value than either of the laboratory methods ordinarily applied, namely, the histological examination of brain tissue for the detection of Negri bodies and the intracerebral inoculation of mice with such tissue, followed by serological identification of the virus when clinical symptoms of rabies developed in the inoculated mice.

In the present report the authors provide fresh evidence in support of their claim and, as a result of their experience with material from 92 more cases, are able to indicate a wider applicability and a greater sensitivity and specificity of their immunological diagnostic method. Thus, the test has been successfully carried out on putrid material submitted for diagnosis—material unsuitable for the detection of Negri bodies or for the intracerebral inoculation of mice. Again it was found that this diagnostic method could detect the presence of an extremely small amount of antigenic substance which did not always contain an amount of active virus sufficient to infect mice. In this connexion it is noteworthy that antigens should be prepared from the mesencephalon or myelencephalon, because of the fact that the corpora quadrigemina and medulla oblongata possess the highest antigenicity.
G. Stuart

Okada, T. **Studies on the Inactivation Methods of the Virus for Preparation of Rabies Vaccine.** *Japanese J. Med. Sci. & Biol.* 1953, Dec., v. 6, No. 6, 577–86.

The fact that inactivation of the rabies virus, with the production of a vaccine of high antigenic potency, had been effected by the action of the heavy-metal salt merthiolate on infected brain emulsions exposed to a temperature of 37°C. for 5 days led the author to investigate the possibility of substituting for merthiolate in the inactivation process other antibacterial

agents proved by his experiments to possess little rabicidal power and likely, therefore, to induce little or no reduction of antigenicity. These other antibacterial agents were cobalt chloride (another heavy-metal salt), acetosulphamine and marfanil (sulphonamide drugs), and acridine dye. The author's findings showed each lot of the vaccines inactivated by heating at 37°C. for 7 days with any one of these 4 agents to be highly potent, relatively thermostable and able to retain a satisfactory measure of potency after storage at 5°C. for one year. *G. Stuart*

PLAGUE

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, rodent hosts, transmission, pathology, diagnosis, clinical findings, treatment, control.

Devignat, R., with the technical collaboration of A. Boivin. Comportement biologique et biochimique de *P. pestis* et de *P. pseudotuberculosis*. [**Biological and Biochemical Characteristics of** *P. pestis* **and** *P. pseudotuberculosis*] *Bull. World Health Organization.* Geneva. 1954, v. 10, No. 3, 463–94. [41 refs.]

The author describes the technical methods and results of a comprehensive comparative study of strains of the 3 varieties of *Pasteurella pestis* and of *P. pseudotuberculosis*. The strains examined were—14 of *P. pestis orientalis* (var. O); 7 of *P. pestis antiqua* (var. A); 3 of *P. pestis mediaevalis* (var. M); 5 of *P. pseudotuberculosis* (PST) and 1 of doubtful nature. Two of the var. O strains and 2 of the var. A strains were avirulent, all the other *P. pestis* strains were virulent.

Var. O is described as not fermenting glycerol but as reducing nitrates to nitrites and as ordinarily producing nitrous acid in broth free from nitrate. Two of the strains had the exceptional property of fermenting rhamnose.

Var. A differs from var. O in fermenting glycerol, and var. M differs from the other two in failing to reduce nitrates to nitrites or to produce nitrous acid in broth free from nitrate.

PST ferments glycerol and ordinarily reduces nitrates to nitrites; it may or may not produce nitrous acid in ordinary broth, but its special features are that it ferments rhamnose, produces urease, and is motile at room temperature (20°–25°C.).

The responses of the varieties of *P. pestis* and of *P. pseudotuberculosis* to bacteriophage were also studied; the name *Phagus yersiniarum* is suggested as being suitable for the plague bacteriophage because of its being normally active against the two species of *Pasteurella* which van Loghem (*Ann. Inst. Pasteur*, 1946, v. 72, 975) has proposed to classify under the generic name *Yersinia* and therefore to name *Y. pestis* and *Y. pseudotuberculosis*.

The detailed comparative description of the biological and biochemical features of the above varieties must be studied in the original paper to which is attached a series of tables in which they are summarized.

The variety *mediaevalis*, found in south-eastern Russia, Kurdistan and Turkey, is of special interest; it differs from the other two and from *P. pseudotuberculosis* in the respects mentioned above and also in multiplying more rapidly in cultures and in not being sensitive to penicillin. It seemed to have a special tendency to produce pulmonary lesions in mice.

Bacteriologists will be specially interested in the technical methods employed by the author who claims that by use of his special "microglucide dish" [this *Bulletin*, 1951, v. 48, 984] and the method of "fermentation by semiproliferating germs" he can obtain a practically complete list of the fermentation responses of a large number of strains within 48 hours. *John W. D. Megaw*

Silverman, S. J., Higuchi, K. & Meyers, E. **Production of Protective Antigens by *Pasteurella pestis* in a Synthetic Medium.** *Proc. Soc. Exper. Biol. & Med.* 1954, May, v. 86, No. 1, 112–14.

Details are given of the composition and method of using a complicated synthetic medium containing 22 ingredients. Cultures of an avirulent strain of *Pasteurella pestis* grown in this yielded a supernatant fluid which acted as an effective vaccine. Given in suitable doses it protected mice against challenge by 100 LD50. No mention is made of comparative tests against other vaccines but further studies are said to be in progress to find the best conditions for growth and antigen production. *John W. D. Megaw*

Robic, J. Trente années de lutte contre la peste à Madagascar. [**Thirty years of Antiplague Effort in Madagascar**] *Rev. Coloniale de Méd. et Chir.* 1954, May 15 & June 15, v. 26, Nos. 224 & 225, 92–102; 116–22, 125, 1 map.

This is an interesting description of the work done at the Pasteur Institute of Tananarive which for the past 30 years has been the headquarters of the intelligence section of the organization for the control of plague in Madagascar. Throughout this period the staff of the Institute have been in the van of progress in plague research and the author's narrative is a fitting tribute to their valuable work.

Among the most striking achievements of the workers at Tananarive has been the development of a safe and effective living vaccine which is still found essential for the control of plague in rural areas of Madagascar where DDT and rodent suppression have not been successful.

John W. D. Megaw

CHOLERA

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Gallut, J. Contribution à l'étude de la toxine cholérique: variation du pouvoir toxique de *Vibrio cholerae* (Ogawa) au cours de la maladie. [**Study of Cholera Toxin. Variation in Toxicity of *V. cholerae* (Ogawa) during the Disease**] *Ann. Inst. Pasteur.* 1954, May, v. 86, No. 5, 561–9, 2 figs.

The relatively feeble toxicity of strains of *V. cholerae in vitro* in contrast to the profound toxic symptoms exhibited by patients with the disease raises the question of whether specially toxic strains of *V. cholerae*, not yet isolated, may exist, or develop, during the course of the illness. The author has attempted to answer this question by the examination of 40 strains of

V. cholerae isolated by Drs. Burrows and Lankford from 10 cases of cholera occurring during February 1953 in Calcutta. On the average 4 strains from each case were studied. The strains were obtained by daily culture from each patient and were received lyophilized having been submitted to only one passage on artificial media. All strains were of Ogawa type and all were smooth except one. Only one of the 10 cases from which they were derived proved fatal, and no patient received any treatment other than intravenous glucose saline, except one, who had had sulphaguanidine.

Each strain was grown on peptone agar (*p*H 8·0) harvested after 16 hours, washed in normal saline, centrifuged and resuspended in 5 cc. glucose saline 0·5 per cent. to a density of 800 thousand million per cc. After 4 hours at 37°C. the *p*H of the glucose saline had fallen to 5·8 and the suspension was then centrifuged at 5,000 r.p.m. for 25 minutes and the supernatant fluid shaken with toluene in order to kill the few vibrios remaining unautolysed in the suspension which now contained all the toxins of the vibrios.

Batches of 24 mice for each strain were then injected intraperitoneally with 0·2, 0·1, 0·05, and 0·025 cc. of the toxins, 6 mice being used for each dose, and observed for 72 hours. Death occurred usually within 24 hours. The toxicity of each strain was measured by its LD50. The results, shown in a table and figure, proved that the toxicity of the strains varied from case to case, and in each one separately, but a strain of maximum toxicity was isolated from each of them, the most toxic strain from each case being from 1·5 to 7·4 times as toxic as the least toxic strain isolated from that case.

These highly toxic strains were isolated usually on the second or third day of the disease between 52 and 62 hours after its onset. The least toxic vibrios were isolated about the 5th day.

The emergence of these hypertoxic strains may be due either to selective multiplication of previously existing organisms or to some toxigenic factor temporarily present in the patient. *V. cholerae* is notoriously unstable in artificial media and it has not been possible so far for the author to ascertain whether these strains retain their toxicity. It is interesting to note that since the isolation of *V. cholerae* is undertaken usually either at the commencement of the disease, for purposes of diagnosis, or late, as a test of cure, these toxic strains may easily be missed. *C. C. B. Gilmour*

AMOEBIASIS AND INTESTINAL PROTOZOAL INFECTIONS

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Anand, B. R. **A Survey of Carriers of Intestinal Parasites in Rajasthan with special reference to** *Entamoeba histolytica*. *J. Indian Med. Ass.* 1954, June, v. 23, No. 9, 398–400.

"1. Samples of stools from 600 persons having vague gastro-intestinal symptoms and from 200 persons without such symptoms were examined for ova and parasites.

"2. The carrier rate of *Ent. histolytica* was high—15·5 per cent. It was also higher among children below 5 years than that reported by other workers in India.

"3. No marked difference in the carrier rates between the two sexes was noted."

Capocaccia, L. & Cao-Pinna, M. La coltivazione della *Entamoeba histolytica* in presenza di due sole specie batteriche. [**Cultivation of *Entamoeba histolytica* with Two Bacterial Species**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Feb., v. 35, No. 2, 55–61. [34 refs.] English summary.

A single strain of *Entamoeba histolytica* was inoculated in 4 different media, to which were added (a) acriflavine, for the inhibition of *Blastocystis*, and (b) penicillin (6,500 units) and streptomycin (0·05 gm./cc.), as anti-bacterial agents. After 33 subcultures the bacteria present were identified by cultural methods. It was found that in each of the 4 media the original flora was reduced to a different combination of 2 concomitant bacteria, as follows: (1) modified Boeck-Drbohlav's: *Bacterium coli* + *Paracolobactrum coliforme*; (2) Balamuth-Sandsa's: *Bact. coli* + unidentified Gram-negative form; (3) modified Dobell-Laidlaw's: *Paracolobactrum coliforme* + *Proteus vulgaris*; (4) Difco "Endamoeba": *Bact. coli* + *Clostridium welchii*. Since the amoebae were growing abundantly in each of these cultures, and the original inoculum contained an identical flora, it is concluded that the difference of opinion among authors, regarding the rôle played by various bacteria in promoting the growth of *E. histolytica*, is due to differences in the media used rather than to the properties of the bacterial associates.

C. A. Hoare

Capocaccia, L. & Cao-Pinna, M. Tecnica per la conta della *Entamoeba histolytica* nelle colture. [**Method for Counting *Entamoeba histolytica* in Culture**] *Arch. Ital. Sci. Med. Trop. e Parassit.* 1954, Feb., v. 35, No. 2, 62–5. English summary (4 lines).

The authors recommend the use of Nageotte's chamber for accurate counts of *Entamoeba histolytica* in culture. The results of a number of such counts in different media are listed, with the standard deviations and coefficients of variation, which were always below 5 per cent.

C. A. Hoare

Entner, N. & Anderson, H. H. **Lactic and Succinic Acid Formation by *Endamoeba histolytica in vitro*.** *Exper. Parasit.* New York. 1954, May, v. 3, No. 3, 234–9.

The authors describe here some preliminary studies on the character of the fermentation taking place in cultures of *E. histolytica* largely freed from other organisms. In order to obtain suitable numbers the amoebae were grown initially in presence of a single bacterium or in other cases accompanied by *T. cruzi*. They were harvested after cultivation in 250 ml. flasks by centrifugation at low speeds and washed in saline-cysteine solution to free them from either the single bacterium present or from *T. cruzi*. The final suspension contained approximately 2 million amoebae per ml. The organisms were finally suspended in saline-bicarbonate at *p*H 7·3 in conventional Warburg vessels in an atmosphere of nitrogen or nitrogen admixed with 5 per cent. carbon dioxide, about 4–6 million amoebae being present in each, with an oxygen absorbent in the centre well.

The formation of lactic and succinic acids was detected in these anaerobic conditions and standard methods were used to measure the amount formed

with starch as the chief substrate. The presence of glucose but not of maltose appeared to inhibit reduction of methylene blue and curiously enough also the production of lactate when amoebae previously grown in association with bacteria were used. When amoebae grown previously with *T. cruzi* were used glucose appeared to favour lactic acid production more than maltose or starch. Succinate was formed only if CO_2 was present, suggesting that fixation of the latter may be one of the reactions involved. The amount of these two substances formed was very small and the contribution made by accompanying bacteria is not quite clear but should have been very small when penicillin was present. *J. D. Fulton*

Mazzitelli, L. La funzionalità epatica nella colite amebica cronica. [**The Functioning of the Liver in Chronic Amoebic Colitis**] *Acta Med. Italica.* 1954, May, v. 9, No. 5, 120–27. [54 refs.] English summary.

This article is an account, not so much of the functions of the liver as the mode in which these functions are carried out, in patients suffering from chronic amoebic colitis. The author states that there are some 25 tests indicating disturbance in liver function and that these may be grouped as follows: (i) tests of excretory function, such as those for bilirubin in the blood and in the urine; (ii) tests of metabolic function, such as the determination of amino-acids in the blood and urine, Bufano's test of protein metabolism, lipid metabolism; and (iii) empirical tests such as those for alkaline phosphatase of the serum and the urinary coproporphyrin. Seven of these tests have been carried out in each of the 153 cases of chronic amoebic colitis which the author has observed in the clinic at Naples, *viz.*, the urobilin, the blood bilirubin, the Rosa Bengala test of excretory function, the Takata Ara, Hanger, MacLagan and Bufano, as tests for metabolic function. For urobilin the Schlesinger fluorescence, for blood bilirubin the method of Jendrassik and Grof; for the others the original methods of the authors who devised them.

The results of each of these in each of the 153 patients are given in a comprehensive table and they are summarized as follows: the urobilinuria was normal in 72, increased in 81, or a little over half (52·9 per cent.); bilirubinaemia normal in 86, increased in 67 (56·2 and 43·8 per cent. respectively); Rosa Bengala, no retention in 106, retention in 47 (69·3 and 30·7); Takata Ara negative in 76, positive in 77; Hanger negative in 41, positive in 112 (26·8 and 73·2); MacLagan negative in 72, positive in 81 (47·1 and 52·9); Bufano negative in 104; positive in 49 (68 and 32). These findings are discussed and the author concludes that impairment of metabolism and excretory function was present in 58·8 per cent., that either metabolic or secretory was impaired in 26·7 per cent., while in the remaining 14·5 per cent. there was no impairment of either function.

H. Harold Scott

Crosnier, R., Darbon, A., Dulac, J. F., Laurens, L. & Maitre, P. Traitement de l'amibiase intestinale par le *bis-(p.* arsonophényl-amino)-1-2 éthane (4.763 R.P.). [**Treatment of Intestinal Amoebiasis with *bis-(p*-arsonophenyl-amino)-1-2-ethane (Bémarsal)**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 936–42.

This arsenical compound [Bémarsal] has already been the subject of favourable report [*e.g.*, this *Bulletin*, 1953, v. 50, 415] by a number of French workers as a curative agent in amoebiasis. The authors enthusiastically confirm its value. They gave a course of treatment with it, followed

by a 20-day course of Direxiode, and then yet a further 10-day course of treatment with Bémarsal, to 30 patients; 28 of them they thought successfully to have been relieved of their amoebiasis by the drug.

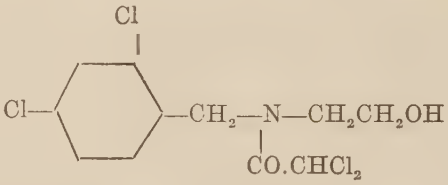
A. R. D. Adams

Canet, J. & Ghestin, F. Traitement de l'amibiase intestinale aiguë en Indochine par le *bis*-(*p*-arsonophénylamino)1-2 éthane. (Résumé.) [**Treatment of Acute Intestinal Amoebiasis in Indo-China with Bémarsal**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 931–6.

The authors have used this preparation [Bémarsal] in the treatment of 55 patients with amoebiasis. The dosage they employed varied from 4 tablets daily for 6 days to 5 tablets daily for 14 days; usually it was 5 tablets daily for 10 days (a total of 25 gm. of the drug). There were no side effects; the clinical effects were good; but relapses, both clinical and parasitic, occurred in some cases. They therefore suggested that the treatment should be repeated after 4 to 6 weeks to avoid these. *A. R. D. Adams*

Dennis, E. W. & Berberian, D. A. **The Chemotherapeutic Properties of Win 5047, (Mantomide). A New Synthetic Amebacide.** *Antibiotics & Chemotherapy.* New York. 1954, May, v. 4, No. 5, 554–60.

The substance named in the title was selected from a large series of compounds for more extensive study in the treatment of amoebiasis. It is N-(2,4-dichlorobenzyl)-N-(2-hydroxyethyl) dichloroacetamide, and possesses the following structural formula



It is a white crystalline powder with somewhat bitter taste, with very low solubility in water but soluble to the extent of 5 per cent. in ethanol. *In vitro* experiments showed that the substance possessed bacteriostatic or bactericidal properties. In concentration of 12·5 μgm. per ml. it proved amoebicidal *in vitro*. It also showed activity against *Entamoeba criceti* the amoeba which naturally infects hamsters when tests were carried out as described by Dennis *et al.* [this *Bulletin*, 1950, v. 47, 243]. The dose which cleared 50 per cent. of test animals (ED50) was found to be 12·4 mgm. per kgm. for 4 days and the drug proved somewhat more effective than chlortetracycline [aureomycin] or oxytetracycline [terramycin]. A dose of 25 mgm./kgm. daily for 5 days on end cleared 3 monkeys of *Entamoeba coli*. Tests showed that the drug possessed no acute oral toxicity for mice and subacute tests in hamsters, rats and monkeys indicated that it was well tolerated in doses far above the therapeutic dose for human patients. Blood levels of the drug were measured and absorption was found to take place from the gastrointestinal tract with subsequent excretion in urine and faeces.

Infection with *E. histolytica* in 3 human patients was successfully treated with doses of 0·75 to 1·0 gm. daily for 8 to 10 days, and no untoward

symptoms were recorded. The encouraging preliminary results indicate that Win 5047 is worth more extensive clinical trials. *J. D. Fulton*

Loughlin, E. H. & Mullin, W.G. **The Treatment of Amebiasis with Win 5047 (Mantomide). N-(2-4-Dichlorobenzyl)-N-(2-Hydroxyethyl) Dichloracetamide.** *Antibiotics & Chemotherapy.* New York. 1954, May, v. 4, No. 5, 570–73.

A new and inexpensive compound is N-(2-4-dichlorobenzyl)-N-(2-hydroxyethyl) dichloracetamide, now named Win 5047 (*Mantomide*). When tested against *Entamoeba histolytica* it is amoebicidal *in vitro* in concentrations as low as 12·5 μgm./ml.; in hamsters infected with non-human amoebae the ED50 dose was 13·8 mgm./kgm.

During 1953, 24 patients who had chronic amoebiasis were treated with Win 5047, the diagnosis being established by the presence of cysts of *E. histolytica* in faecal smears and confirmed in specimens stained with iron haematoxylin. The dose of Win 5047 was calculated according to the age of the patient: to those less than 5 years doses of 250 mgm. were given orally three times daily for 8 days; to those between 5 and 10 years 500 mgm. three times daily for 10 days; to those over 10 years, 750 mgm. to 1 gm. were given three times daily for 10 to 8 days respectively.

One patient continued to harbour *E. histolytica* 3 weeks after treatment. The dose of Win 5047 was increased to 1·0 gm. three times daily and the course of therapy was repeated for 10 days. Afterwards the faeces became negative for *E. histolytica*.

Otherwise, the drug proved highly effective in eliminating *E. histolytica* cysts and showed no evidence of toxicity.

It is suggested that Win 5047 might be used in highly endemic areas in the programme of control of amoebiasis. The optimum dosage and the possible efficacy of the drug in acute intestinal amoebiasis should be studied.

Philip Manson-Bahr

Ansari, M. A. R. **A Note on Miscellaneous Observations on *Giardia muris* (Grassi, 1879).** *Pakistan J. of Health.* 1954, Jan., v. 3, No. 4, 207–26, 6 pls.

The author gives a detailed account of the structure, bionomics, host-parasite relations and chemotherapy of *Giardia muris*, based on experimental studies carried out with laboratory mice. [In view of the many gaps in our knowledge of *G. intestinalis*, the observations described in this paper will be useful to parasitologists and clinicians dealing with human giardiasis.]

C. A. Hoare

RELAPSING FEVER AND OTHER SPIROCHAETOSES

Pavlovskiĭ, E. N. & Skrȳnnik, A. N. [**Experimental Analysis of the Importance of the Different Phases in the Metamorphosis of *Ornithodoros papillipes* in the Transmission of the Spirochaetes of Tick-Borne Relapsing Fever**] *Parasit. Sborn.* Moscow. 1952, v. 14, 47–55. [In Russian.] [Summary taken from *Rev. Applied Entom.* Ser. B. 1954, May, v. 42, Pt. 5, 68–9.]

The investigations described were carried out in Leningrad in 1949 and 1950 with about 3,000 laboratory-bred examples of *Ornithodoros tholozani*

(Lab. & Mégn.) (*papillipes* (Bir.)), which were allowed to feed in different stages on guineapigs infected with various Central Asiatic strains of tick-borne relapsing fever, to determine the importance of the stages in the transmission of the disease. Some of the results of previous observations are included. The ticks were kept at 26°C. [78·8°F.] in flasks moistened with a drop of water once a week, and infected when necessary by feeding on guineapigs when spirochaetes were numerous in their blood.

In tests with the offspring of infected females, conducted over a period of more than ten years, only five out of 63 batches infected the guineapigs on which they fed as larvae, whereas 18 of the same batches infected those on which they fed as first-stage nymphs. This indicated that ticks that have inherited the infection rarely transmit it before reaching the nymphal stage. Larvae that had engorged on an infected guineapig could not be induced to feed again before moulting, and those that were removed from the infected host before they had completed the meal and were transferred to healthy guineapigs from 30 minutes to 19 days later did not usually attach themselves and the few that did so did not cause infection. A batch of the same ticks in the first nymphal stage effected transmission. It appears, therefore, that the importance of the larvae in the actual transmission of the spirochaetes is insignificant, though they can acquire and preserve them.

Ticks that had become infected as larvae or nymphs usually transmitted the infection to guineapigs after the next moult, but a minimum period of time from the infecting feed was necessary before they could do so. This became progressively longer as the nymphs became older, and the shortest periods for second-, third- and fourth-stage nymphs and adults were 27, 43, 152 and 155 days respectively; sometimes they were considerably longer. In experiments in which infected adult ticks were fed 1–2 at a time on healthy guineapigs, infection resulted in only 7 of 20 tests, and the minimum number of days that elapsed after the initial infective meal was 112. Adults can acquire infection at any age. Thus, examples collected in Tadzhikistan in 1937 and allowed to feed on healthy guineapigs five times during 1938–44 did not infect them, but after the surviving males had fed on an infected animal in 1948 they transmitted the disease to a healthy one in 1949, and in similar tests with a batch from the Pamirs, a female became infected in its 12th year of life in the laboratory.

Mazzotti, L. Presencia en México, de espiroquetas de la fiebre recurrente en *Ornithodoros talaje*. [**Presence of Relapsing Fever Spirochaetes in *Ornithodoros talaje* in Mexico**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 285–7. [10 refs.]

The English summary appended to the paper is as follows:—

"*Ornithodoros talaje* was found infected with relapsing fever spirochetes in Mexico."

Masseguin, A., Palinacci, A. & Brumpt, V. Présence de spirochètes dans les glandes salivaires d'un exemplaire *Anopheles funestus* (Giles, 1900). [**The Presence of Spirochaetes in the Salivary Glands of a Specimen of *Anopheles funestus***] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 234–6.

The authors record the finding of a spirochaete, morphologically similar to those of the relapsing fever group, in a stained preparation of the salivary

glands of *A. funestus* caught in the village of Kelesso, Upper Volta. During 1953 a total of 7,923 *Anopheles* were examined for sporozoites in this neighbourhood and only once have spirochaetes been observed. No cases of either human or avian spirochaetosis were found in this region and the origin of the spirochaete is obscure.

[Spirochaetes have been noted previously in the salivary glands of Culicines and named *Spirochaeta culicis*, Jaffé, 1907; it is doubtful whether they have any pathological significance. (See Sinton and Shute, this *Bulletin*, 1940, v. 37, 204.)] *Edward Hindle*

LEPROSY

In this section abstracts are arranged as far as possible in the following order:—epidemiology, aetiology, pathology, diagnosis, clinical findings, treatment, control.

Gillet, J. La lèpre au Congo belge. [**Leprosy in the Belgian Congo**] *Inst. Roy. Colonial Belge Bull. des Séances.* 1954, v. 25, No. 1, 303–25. [52 refs.]

A general review written in connexion with the nosological map to be published in the *Atlas Général du Congo*.

González Prendes, M. A. La lepra en las Antillas. [**Leprosy in the Antilles**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1954, Jan.–June, v. 10, No. 1, 16–25. [20 refs.]

An estimate of the total number of people with leprosy in 1900 was 4,491, and in 1950 it was 14,446, in the Greater and Lesser Antilles. According to this there has been an increase of 400 per cent. in the last 50 years. It is recognized that the problem is one which concerns the Antilles as a whole and it is suggested that a joint study should be made throughout all these territories. " The destiny of our Antilles is in our own hands. Their future depends upon our present action. Is leprosy going to spread further in the area of the Caribbean Sea? " [abstracter's translation]. *Ernest Muir*

González Prendes, M. A., Valhuerdi Fernández, C., Hechevarría Vaillant, F., Cruz Báez, R. & Vega Hernández, S. Características generales de los pacientes hospitalizados en el Sanatorio Nacional " San Luis de Jagua ". [**General Characteristics of the Patients Hospitalized in the National Sanatorium " San Luis de Jagua "**] *Rev. Sifilografía, Leprología y Dermatología.* Marianao, Cuba. 1954, Jan.–June, v. 10, No. 1, 40–45.

Of 3 original hospitals in Cuba for patients suffering from leprosy 2 have disappeared, leaving only the National Sanatorium " San Luis de Jagua ". This institution was begun in 1944 and has at present 363 patients, about two-thirds of whom are males. The excellent arrangements for the treatment, employment, amusement, etc., of the patients are fully described and illustrated. Marriages are encouraged among the patients in the sanatorium, the children born of such marriages being removed at birth and

lodged with the relatives outside. Eighty and a half per cent. of the patients suffer from the lepromatous form of the disease; 68·6 per cent. of those admitted are either farmers or house servants. Since the opening of the sanatorium it has lodged 750 patients. *Ernest Muir*

Dreisbach, J. A. **A Case of Leprosy in a Seven Months Old Child.** *Leprosy Review.* 1954, Apr., v. 25, No. 2, 81–2.

"A case is reported of a seven months old child with clinical leprosy. The clinical findings and response to sulphetrone treatment are discussed."

Balasubrahmanyan, M., Jayaraj, A. P. & Gass, H. H. **An Improved Histological Method for Examination of Cutaneous Nerves in Leprosy.** *Leprosy Review.* 1954, Apr., v. 25, No. 2, 83–6, 6 figs.

Two processes are described, one for staining the axons of fine nerve branches in the skin, and the other for showing lepra bacilli in the myelin sheath. For the first a silver impregnation technique is used which is a modification of former methods. With this, uniformly clear results are obtained, much better than were obtained by former techniques. Illustrations of the method are given showing a Meissner's corpuscle, the network of nerve fibres round a normal hair follicle, fine nerve endings in the epithelium and ballooning of axons in lepromatous leprosy. By means of the second technique acid-fast bacilli are shown stained red against the myelin sheath which is stained black. For both methods frozen sections are used. For the full techniques readers are referred to the original.
Ernest Muir

See also p. 1046, de Almeida, de Freitas & Brandão, **Complement Fixation Test with a Triple Antigen for Syphilis, Tuberculosis, Leprosy or Chagas' Disease in Blood Banks.**

Floch, H. Sur l'intérêt de l'utilisation d'antigènes de Mitsuda dilués. [**On the Advantage of using Mitsuda's Antigen in a Diluted Form**] *Arch. Inst. Pasteur de la Guyane Française. Publication No. 316.* 1954, Jan., 6 pp., 2 figs.

Following the work of the Cuban and Brazilian workers the author used the Mitsuda antigen diluted to 1 in 50, 1 in 150, 1 in 300, 1 in 500, and 1 in 750, comparing the results in positive cases with those obtained with the usual 1 in 30 dilution. The differences shown in a graph are comparatively slight up to the 1 in 750 dilution, but more marked thereafter. Although it is difficult to standardize the Mitsuda antigen this does not matter much as within a wide range of dilution there is very little difference in the results obtained. *Ernest Muir*

Iglesia, M. H. Tratamiento de la reacción leprosa con cortisona. (Comunicación previa.) [**Treatment of Lepra Reaction with Cortisone. (Preliminary Note)**] *Rev. Asoc. Med. Argentina.* 1954, Mar. 15–30, v. 68, Nos. 769/70, 55–7, 6 figs.

Treatment was given to 4 lepromatous patients and 1 prelepromatous patient. The acetate of Cortone (Merk) was used, beginning with 200 mgm.

orally in divided doses on the first day and gradually diminishing to 100 or 75 mgm. In one very severe case, 400 mgm. was given. All the patients were suffering from severe lepra reaction. In the most severe case a total of 8 gm. had to be given. The reaction subsided in all cases, the pain disappeared, the patients had a feeling of well-being, appetite returned, nodules and eruptions flattened out and disappeared, and the eye symptoms disappeared. However, bacteriological examination did not show any diminution of bacilli. The author stresses the importance of early administration of the drug in adequate doses. In 3 patients there was slight return of reaction, but in a much less severe form. *Ernest Muir*

Roy, A. T. **Diaminodiphenylsulphone in Leprosy. Its Oral and Parenteral Use.** (A Comparison.) *Leprosy Review.* 1954, Apr., v. 25, No. 2, 77–80.

A report of 98 patients treated with oral DDS and 140 with parenteral DDS is given. (The author used a 20 per cent. suspension in hydnocarpus or coconut oil.) In the former improvement was shown in 75 per cent., and in the latter in 74·2 per cent. But the average amount of the drug used orally was 57 gm. and the average time 17·1 months, while parenterally only 19·38 gm. was used on an average and the average time was only 12 months. The conclusion is that if the trouble of injecting is not considered there is a real advantage in using the suspension of DDS parenterally. *Ernest Muir*

Morris, C. W. J. **The Treatment of Leprosy with Thiosemicarbazone.** *Leprosy Review.* 1954, Apr., v. 25, No. 2, 73–7.

The author treated 38 leprosy patients, 20 with the lepromatous type, with Neustab (thiacetazone) for 9 months to 1 year. Of these 20 had been found intolerant to DDS. The daily dose was 12·5 mgm. rising slowly to 150 mgm. given 6 days a week. All showed clinical improvement and there were no serious complications. There were satisfactory results in those who were intolerant to DDS. As there was a fall in the haemoglobin level, ferrous sulphate, 6 grains, was given daily. "A second arrow for the pharmaceutical bow in the battle against leprosy is indeed acceptable and welcome." *Ernest Muir*

Herrera, G. El Contebén en el tratamiento de la lepra. [**Conteben in the Treatment of Leprosy**] *Rev. Med. Dominicana.* 1953, Apr.–May–June, v. 8, No. 2, 121–35, 16 figs.

Conteben (4-acetylaminobenzaldehyde-thiosemicarbazone) was administered to 12 leprosy patients for periods of 9 to 12 months. Of the patients, 7 were of the lepromatous type and 5 were reacting tuberculoids. It was given orally beginning with 12·5 mgm. and rising to an average dose of 250 mgm., administered daily except for interruptions depending on the condition of the patients. The maximum was 400 mgm. The chief toxic reaction was haemolysis which was countered with sulphate of iron, so that the blood cell counts and the percentage of haemoglobin were not diminished. Of the patients who had 12 months' treatment the clinical signs cleared up entirely in 41·5 per cent. Of those who had only 9 months' treatment 33·5 per cent. made notable improvement and 25 per cent. progressed

satisfactorily. The author considers that further trials are necessary to determine the exact place of this drug in the treatment of leprosy.
Ernest Muir

Iglesia, M. H., Scappini, J. F. & Castañé Decoud, A. La hidracida del ácido isonicotínico en el tratamiento de la lepra (nuestra experiencia). [**Isoniazid in the Treatment of Leprosy**] *Rev. Asoc. Med. Argentina.* 1954, Mar. 15–30, v. 68, Nos. 769–70, 91–3.

Fifteen cases of leprosy were treated orally with isoniazid for a period of 1 year. Of these 11 were lepromatous, 3 tuberculoid and 1 uncharacteristic. There was no modification in their condition, and 4 of them suffered from lepra reaction. The only improvement was during the first few months when there was some clinical amelioration. *Ernest Muir*

Davidson, W. S. **Isoniazid Alone and in Combination with other Drugs in the Treatment of Leprosy.** *Leprosy Review.* 1954, Apr., v. 25, No. 2, 69–73, 1 graph.

Two series of cases were treated. Series A consisted of 10 patients who were given isoniazid for 9 months during which time they made progress, slower towards the end of the period. From the 10th to the 14th month they were given combined isoniazid and Sulphetrone treatment. During this period improvement was retarded and deterioration took place. From the 15th to the 17th month half the patients were given isoniazid alone and the other half intramuscular Sulphetrone alone, with the result that both groups made satisfactory improvement as before. The second series consisted of 6 patients resistant to Sulphetrone and other drugs. As they did not make much improvement on isoniazid in the first 9 months they were given a combination of isoniazid and Neustab (thiacetazone). The total result in 12 months was improvement in 3 cases, deterioration in 2 and no change in 1. *Ernest Muir*

Kanakaraj, J. D. **Plastic Surgery in the Rehabilitation of the Leprosy Patient.** *Leprosy Review.* 1954, Apr., v. 25, No. 2, 87–101, 11 figs.

HELMINTHIASIS

In this section abstracts are arranged as far as possible in the following order:—Trematodes (*schistosomes, other flukes*); Cestodes (*Diphyllobothrium, Taenia, Echinococcus, other cestodes*); Nematodes (*Hookworms, Ascaris, Filarial worms, Dracunculus, etc., Trichuris, Enterobius, Trichinella, etc.*).

Gillet, J. & Wolfs, J. Les bilharzioses humaines au Congo Belge et au Ruanda-Urundi. [**Human Schistosomiasis in the Belgian Congo and Ruanda-Urundi**] *Bull. World Health Organization.* Geneva. 1954, v. 10, No. 3, 315–419, 14 figs. [134 refs.]

This paper is a detailed study of the distribution, transmission, treatment and control of human schistosomiasis in the Belgian Congo. Most of the data have been derived from the work of others but, in addition, there are

many interesting observations by the authors. A list of 134 references is given. The paper starts with a brief classification of the Planorbidae and Lymnaeidae of the Belgian Congo based on that of Schwetz and Bequaert [this *Bulletin*, 1949, v. 46, 1156] and this is followed by 2 lists of their distribution in the territory, the first being from the records of other investigators and the second being the authors' own collections identified by Dr. Mandal-Barth.

In 1950 some 8,700 cases of *Schistosoma mansoni* were diagnosed. The disease is endemic in a broad belt extending along the south-eastern, eastern and northern frontiers. There are 2 other foci, a large one in Kasai province and a group of small ones in the districts near the mouth of the Congo. Only the larger species of *Planorbis* are vectors. Details of the incidence and pathogenicity of the disease in infected localities are recorded. In general the infection is a mild one but, in cases with clinical symptoms, intestinal and hepatosplenic syndromes occur.

Urinary schistosomiasis was first introduced into the Belgian Congo some 30 years ago from Nyasaland and Northern Rhodesia. The vector, *Physopsis africana*, is widely distributed in eastern Congo but *S. haematobium* occurs only in Katanga province along the Lualaba and Luapula rivers, and in Low and Middle Congo provinces near the mouth of the Congo River. The disease is mild. Intestinal infections with terminal-spined ova, due to *S. intercalatum*, cause a mild and easily treated infection of man. Apart from the shape of the egg this worm is morphologically identical with *S. haematobium* in all its stages, but it can be transmitted to sheep while *S. haematobium* cannot. So far as is known this infection has a very focal distribution in the Lualaba valley only.

The methods of diagnosis and treatment are described. Potassium antimony tartrate is still used in all uncomplicated cases. Satisfactory results have been obtained with Miracil D in a small number of patients with *S. mansoni* infection after a course of 20 mgm./kgm. body weight daily for 6 or more days according to the severity of the case. In regard to control, the authors state that several measures should be used together, emphasizing particular methods in particular circumstances. Education requires to be supplemented by techniques giving more rapid results. Mass treatment has been satisfactory in some circumstances, but not in hyperendemic areas. Protected water supplies have already been installed in the more important towns and others will receive them soon. Copper sulphate is the only molluscicide in routine use and in some alkaline waters (*p*H 9) it is ineffective because it is precipitated unless acid is added. In laboratory experiments with this alkaline water sodium pentachlorophenate was satisfactory in a concentration of 30 parts per million, and it gave a 50 per cent. kill of *Planorbis* at 8 parts per million. Among biological control measures, the introduction of siluroid fish (*Serranochromis*) proved satisfactory for vector control in fish ponds. They were as good to eat as *Tilapia*.

A review cannot do more than indicate the general scope of this excellent paper. It provides in easily accessible form almost all the information available regarding schistosomiasis in Belgian Congo. *T. H. Davey*

Schwetz, J. Sur les variations individuelles dans les oeufs des schistosomes. [**Individual Varieties in Schistosome Eggs**] *C.R. Soc. Biol.* 1953, Dec., v. 147, Nos. 23/24, 2051–3, 6 figs.

The author's summary in French is translated freely as follows:

Both at Kongolo and at Jadotville we have found typical eggs of *S. haematobium* and others resembling more those of *S. intercalatum* in the

urine of patients with schistosomiasis. Eggs intermediate in form between these two were also found. *J. J. C. Buckley*

Schwetz, J. Sur un cas de bilharziose vésicale à *S. mansoni* ou, du moins, sur un cas de bilharziose avec nombreux oeufs à éperon latéral, sans oeufs à éperon terminal concomitant, dans les urines d'un garçon indigène de Kongolo (Congo Belge). [**A Case of Urinary Schistosomiasis showing only Lateral-Spined Eggs in Large Numbers in the Urine in an African Child in Kongolo, Belgian Congo**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 81–3, 4 figs. on pl.

The author comments on the general rule that eggs of *S. haematobium* are rarely found in stools and eggs of *S. mansoni* are rarely found in urine, and that when these anomalous eggs are present they are associated with the kind of eggs normally found in urine and stools respectively. He records herein an interesting exception to this rule from Kongolo. A boy of 13 years was found to be passing quite large numbers of lateral-spined eggs in his urine, which contained no terminal-spined eggs. Repeated examination of his stools revealed a single egg of *S. mansoni*. Four of the eggs are illustrated by photomicrographs. It is remarked that the eggs are slightly different from those of *S. mansoni* and bear some resemblance to those of a variety found in wild rodents, *viz.*, *S. mansoni* var. *rodentorum* [this *Bulletin*, 1954, v. 51, 72] in which the spine is very long and there is a notch between the base of the spine and the body of the egg.

The boy complained of no symptoms and his urine was clear.

J. J. C. Buckley

Schneider, J. **Intestinal Schistosomiasis in the Northern and Eastern Transvaal, Union of South Africa.** *J. Trop. Med. & Hyg.* 1954, May, v. 57, No. 5, 112–16, 1 map. [16 refs.]

The author is a Medical Officer in the Health Department of the Union of South Africa. He tabulates his findings, indicating the localities where examinations were done, the age and sex of the persons examined, and the diagnosis—which is based on a single biopsy.

He gives the following summary:—

"(1) The technique of rectal biopsy was employed to ascertain the incidence of intestinal schistosomiasis amongst Africans living in the Northern and Eastern Transvaal.

"(2) The results obtained in a series of 110 unselected cases show that there is a high incidence of intestinal schistosomiasis amongst these people (overall incidence 50·9 per cent) with the exception of those living in the Pietersburg District.

"(3) There is a high incidence of *S. mansoni* infections (over 40 per cent.) amongst Africans of the North-Eastern and Eastern Transvaal, as opposed to a low incidence of the disease in the Northern Transvaal.

"(4) Ova of *S. haematobium* were found in 42 cases (38·2 per cent.), thus showing the frequency with which they may be found on rectal biopsy.

"(5) The existence and spread of intestinal schistosomiasis in the Northern and Eastern Transvaal is contributed to by:—

(a) Human beings infected with the disease.

(b) The presence of Physopsis and Planorbis snails throughout the territory.

(c) Increased irrigation work, and perhaps

(d) Altitude below 3,000 feet in the case of *S. mansoni* infections."

A. R. D. Adams

Pitchford, R. J. **A Comparative Study of Examination of Urine and Stool, and of Rectal Biopsy Material, for Diagnosis of Bilharziasis.** *South African Med. J.* 1954, June 19, v. 28, No. 25, 518–20, 2 figs.

This study was undertaken in the Transvaal. Each specimen of urine was voided in the morning and the sediment tested for ova 2 hours later, without the use of a centrifuge. One stool specimen of each subject was submitted to acid-ether extraction. Viability of ova was gauged on their appearance, since all ova are killed by the acetic acid. [This appears to the abstracter to be contradictory.] Rectal biopsies were performed only on patients over the age of 9 years and all patients were non-Europeans drawn from the same region, some living in African reserves and some on European farms. The rectal biopsies were not necessarily carried out on the same patients on whom urine and stool examinations were performed. The author says: " Since the number of cases recorded is thought to be sufficiently large, this fact does not affect the picture, as the overall incidence of the two diseases in any one particular area remains constant ". [The abstracter considers that such a comparison is not without bias. To compare fairly the rectal biopsy technique with that of microscopical examination of the urinary and stool specimens, rectal biopsies should have been carried out on the same subjects. Further, far greater numbers were selected for the microscopical examination of the specimens (1,888 stool and 1,557 urine) than for the rectal biopsy technique (286).]

The author's results are summarized as follows:—

S. mansoni

(a) Viable Ova

No significant difference was noticed between the findings by rectal biopsy and those by stool examination. Africans in European areas had an incidence rate of 60·8 per cent. (rectal biopsy) and 67 per cent. (stool examination) and those in African reserves 20·2 per cent. (rectal biopsy) and 21·2 per cent. (stool examination).

(b) Non-Viable Ova

Rectal biopsy is superior to stool examination, there being 65·7 per cent. (rectal biopsy) and 0·3 per cent. (stool examination) in European areas and 36·3 per cent. (rectal biopsy) and 0·7 per cent. (stool examination) in African areas.

The author observes that non-viable ova are not excreted to the same extent as viable ones, since they tend to remain in the gut wall. *S. mansoni* was very rarely discovered in urine.

S. haematobium

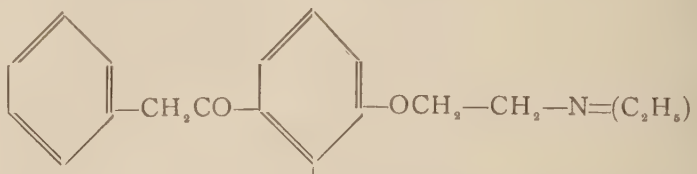
There was a significant difference in the total positive results. By rectal snip, 80·4 per cent. were positive (286 examined) and by urine examination only 60·62 per cent., although only 5·9 per cent. of cases examined by the rectal biopsy method had viable ova of *S. haematobium*. The author wonders why the majority of ova in the rectum were non-viable and tentatively suggests that the non-viable terminal-spine ova in the bowel were not *S. haematobium* but some other species of schistosome with ova resembling those of *S. haematobium*. *M. Gelfand*

Deschiens, R., Lamy, L., Libermann, D., Cottet, J. & Reynaud, R. Sur les propriétés anthelminthiques des désoxybenzoïnes basiques. [**The Anthelmintic Properties of Basic Deoxybenzoins**] Reprinted from *C.R. Acad. Sci.* 1954, v. 238, 168–70.

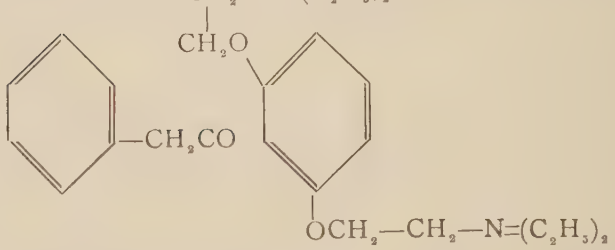
A derivative of one of the thioxanthones, the hydrochloride of 1 diethylaminoethylamino-4-methyl thioxanthone [Miracil D] prepared by Mauss

(*Naturwissenschaften*, 1946, v. 33, 253) in 1946 has been shown to be an effective schistisomicide [this *Bulletin*, 1948, v. 45, 526]. The compound has been further modified chemically in an endeavour to increase the anthelmintic activity. Some of these modified compounds, which also show antibacterial activity, have been tested for anthelmintic activity *in vitro* on a culture of *Rhabditis macrocerca*, and *in vivo* on *Aspicularis tetraptera* and *Syphacia obvelata* in mice, and on *Hymenolepis nana* var. *fraterna* in mice. One of them, *bis*(diethylaminoethoxy)-2·4 desoxybenzoin, or 1183 TH, shows marked anthelmintic activity. This compound consists of a mixture in the proportions of 90 per cent. to 10 per cent. of two isomers with the following formulae:—

(1183)



(1183 *bis*)



The mixture is of low toxicity, and the second of these two compounds is much less active than is the former. The curative oral dose for the mouse oxyurids is 0·05 gm./kgm. of body weight, and the lethal dose for mice, given intramuscularly, is between 0·625 and 1·250 gm./kgm.; so the therapeutic index in mice is about 1/25.

Thirty-three Africans with *Schistosoma haematobium* infections have been treated orally at Brazzaville with 1183 TH in doses of 0·0067 gm./kgm. daily for 8 days, or a total of about 0·4 gm./kgm. for an adult of 60 kgm. After a break of one week the treatment was repeated. On the conclusion of the treatment and over a period of observation thereafter of 3 weeks the urines of 22 (66·6 per cent.) of the 33 patients treated were free from eggs, and clinically the patients seemed to be cured: 6 (18 per cent.) of the patients were passing only degenerate eggs in the urine, and equally seemed clinically to be cured; the remaining 5 (15 per cent.) continued to pass scanty eggs in the urine though they also were rendered free of clinical signs.

Another *S. haematobium* infected patient treated in the Upper Volta area seemed to be cured by this treatment; 5 cases of *S. mansoni* infection also were similarly treated in this latter area; one of them seemed to be cured, and another 2 were materially improved, the number of eggs passed in their stools being reduced by treatment.

It therefore seems that 1183 TH is an effective anthelmintic in urinary schistosomiasis; it has proved virtually non-toxic and so an increased dosage

schedule may be practicable, with a corresponding increase in the absolute cure rate. *A. R. D. Adams*

Martínez Larré, M. & Ravelo de la Fuente, J. de J. Esquistosomiásis en la República Dominicana. [**Schistosomiasis in the Republic of Dominica**] *Rev. Med. Dominicana.* 1953, Jan.–Feb.–Mar., v. 8, No. 1, 44–9.

The authors sketch the history of *Schistosoma mansoni* infection in the western hemisphere and, coming nearer home, show that it has been present in Hato Mayor for at least 10 years. Examination of the faeces of 243 children between the ages of 5 and 15 years revealed 52 (21·4 per cent.) as positive; infection was particularly rife around the Paña Paña rivulet. Here and on the borders of Las Guamas river, in the Hato Mayor district, *Australorbis glabratus* abounded, many of them infected.

The authors examined the faeces of 653 persons in Hato Mayor, between 5 and 60 years of age, and found 15·3 per cent. infected. The estimated population is about 4,000 and thus the numbers probably infected amount to more than 600 [the authors say 60, an obvious mistake] and, though the ages of those infected are not mentioned, it is stated that the percentage is greater among those over 16 years of age. In Las Palmillas, about 4 km. from Hato Mayor, 65 were examined—about one-fifth of the population—and " 4·6 per cent. were found positive " [presumably 3 of the 65]. Of 153 specimens of *Australorbis glabratus* examined (among 204 collected) 3 were found infected. As these were examined from small pools in a time of drought, in the rainy season and at flood times the numbers would probably be greater and the problem then becomes one of epidemiological importance. *H. Harold Scott*

Vaughn, C. M., Olivier, L., Hendricks, J. R. & Mackie, T. T. **Molluscicide Operations in an Endemic Area of Schistosomiasis in the Dominican Republic.** *Amer. J. Trop. Med. & Hyg.* 1954, May, v. 3, No. 3, 518–28, 1 fig.

In the vicinity of Hato Mayor in the Dominican Republic schistosomiasis is endemic, but the vector, *Australorbis glabratus*, was present only in 2 streams to the east of the town [this *Bulletin*, 1953, v. 50, 39]. It was thought that the disease might be controlled or eradicated from the town by poisoning the snails in these streams. Sodium pentachlorophenate was the molluscicide chosen and it was used in the form of 1 oz. briquettes containing 75 to 79 per cent. of the molluscicide, or as a surface spray. Snail counts were made before and after treatment and numerous water samples were tested to determine the concentration of the chemical at various periods after treatment.

The briquettes were evenly distributed through the pools formed in the bed of the river in the first study but, because the actual concentration of the molluscicide was below the calculated dose of 15 parts per million, in the second study they were placed in the flowing water between pools. No living snails were found on searches made one day, 3 weeks, 5 months and 6 months after the treatment. The treated water passed slowly downstream and concentrations as high as 4 parts per million were noted in pools below the treated area during the 6 days after dosing. It was also noted that snails were killed in pools where the concentration had not exceeded 2 parts per million. All fish in the treated area were killed and also in pools downstream where a concentration of 1 part per million was reached and even where only trace quantities were recorded.

In a study of the other river which was composed of a series of unconnected pools, sodium pentachlorophenate was sprayed over the surface to produce a concentration of 5 parts per million. The bottoms of the pools were composed of mud 3 to 6 inches thick and the molluscicide was distributed by a man wading through the pools. This made the water turbid for two days afterwards and the suspended matter may have reduced the concentration of the chemical solution. No living snails were found at 1 and 7 days after treatment, even though the highest concentration noted in any pool was 3 parts per million and most of the readings showed negative or trace concentrations.

The briquette form of treatment proved easy and rapid, and good concentrations of the chemical resulted, especially when the briquettes were placed in running water. Application by spraying of solutions was efficient but was slow and laborious. In flowing water sodium pentachlorophenate is carried downstream in effective strength and so need only be applied at intervals determined by trial. *T. H. Davey*

Vallejo-Freire, A., Ribeiro, O. F. & Ribeiro, I. F. **Quaternary Ammonium Compounds as Molluscacides.** *Science.* 1954, Apr. 9, v. 119, 470–72, 1 fig.

Tests were carried out in Santos, Brazil, with 18 quaternary ammonium compounds, or mixtures thereof, against *Australorbis immunis*, in aqueous solutions of 30, 20, 10, 5, 2·5 and 1 parts per million. Fifty snails were used for each solution and the contact time was 48 hours. For comparison, similar tests were carried out with a technical grade sodium pentachlorophenate ("Santobrite"). The retarded effect of each chemical, in a concentration of 10 parts per million was also studied. "These results show that some quaternary ammonium compounds have the same or greater rapidity of action than sodium pentachlorophenate, and that with the majority of these compounds the retarded effect is great, with less time of effective contact with the active solutions." It is pointed out that these compounds are of lower toxicity for human beings and domestic animals than other known molluscicides. *J. J. C. Buckley*

Stonehill, R. B., Cleve, E. A. & Webb, W. M. **Schistosomiasis japonica diagnosed by Needle Biopsy of the Liver.** Report of a Case. *J. Amer. Med. Ass.* 1954, June 5, v. 155, No. 6, 567–8, 1 fig.

The authors record the diagnosis, after 3 rectal biopsies and 6 stool examinations had failed, of a *Schistosoma japonicum* infection by biopsy of the liver with the Vim-Silverman biopsy needle. A photograph shows the egg of *S. japonicum* thus revealed in the liver. The authors could not find in the literature any references to this method of diagnosis, but Ling, Cheng, and Chung [this *Bulletin*, 1950, v. 47, 380] suggested the use of it.

The patient, aged 49, had a history of convulsive seizures for 6 months. As a Japanese prisoner of war he had had malaria, dengue, typhus, amoebic colitis, beriberi and recurrent pruritic dermatitis of the lower parts of the legs. His sclerae were mildly icteric. The liver extended from the fifth intercostal space to 10 cm. below the costal margin in the midclavicular line; it was firm and was not tender and there were no gross irregularities of its border. Other details of the clinical examination are given. There was nystagmus on left lateral gaze and unpaired incoordination of the upper extremities.

On a high protein diet and multiple vitamin therapy, but no other treatment, the patient remained asymptomatic. In 4 weeks the icterus had faded and liver function tests showed improvement. The existence of clinical schistosomiasis was not proved. After mild anticonvulsive treatment the patient was discharged from hospital. The authors felt that the presence of *S. japonicum* producing viable eggs was not likely 9 years after infection [but see Berberian *et al.*, this *Bulletin*, 1954, v. 51, 188, who reported the survival of adult *S. mansoni* and *S. haematobium* for 26 years, and possibly for 40 years after the patient had left the focus of his infection].

Terry (*Brit. Med. J.*, 1952, v. i, 1102) reviewing 10,600 biopsies of the liver, reported that mortality associated with the use of the Vim-Silverman needle with a transthoracic approach is 0·12 per cent. This is therefore a safe method that may make it possible to avoid a laparotomy. Skin tests may be misleading and stool examinations may fail to show the eggs. Rectal biopsies are more accurate, but Ling, Cheng and Chung [*loc. cit.*] reported 11 per cent. of failures by this method. *G. Lapage*

deWitt, W. B. **A Useful Technique for Exposure of Animals to Cercariae of** *Schistosoma japonicum*. [Research Notes.] *J. Parasitology*. 1954, Apr., v. 40, No. 2, 234.

In this technique a human hair loop of 2 to 5 mm. in diameter is used for transferring cercariae to the laboratory animal. The looping is done from the surface of the water under a dissecting microscope and the cercariae are counted on the loop before being applied to the skin. Mice are prepared for exposure by clipping the abdominal hair closely; they are then anaesthetized by intraperitoneal injection with a solution of sodium nembutal (1·5 ml. to 9 ml. sterile normal saline) at the rate of 0·01 ml. per gm. body weight, which produces anaesthesia for 1 to 2 hours.

"Uniformity of infection and the number of worms coming to maturity compare favorably with results by other methods. From 64 mice exposed to 50 cercariae each, an average of 64·3 per cent., ranging from 41 to 94 per cent., of the cercariae to which each mouse was exposed was recovered as adult worms. This represents a higher percentage return than reported for other methods of exposure." *J. J. C. Buckley*

Maekawa, K., Kitazawa, K. & Kushibe, M. Purification et cristallisation de l'antigène pour la dermo-réaction allergique vis-à-vis de *Fasciola hepatica*. [**Purification and Crystallization of the Antigen used in the Intradermal Reaction for** *Fasciola hepatica*] *C.R. Soc. Biol.* 1954, Apr., v. 148, Nos. 7/8, 763–5, 2 figs.

Pérez Fontana, V. Investigación de huevos de helmintos. Con especial referencia a la epidemiologia de la hidatidosis. [**Study of Helminth Ova, particularly with Reference to the Epidemiology of Hydatidosis**] *Folia Clin. et Biol.* S. Paulo. 1953, Sept., v. 20, No. 2, 119–22.

Search for oncospheres of *Echinococcus granulosus* is essential in the study of the epidemiology of hydatidosis. There are two basic methods for examining faeces for helminth ova: (1) dilution, decantation and centrifugation and examination of the deposit, *i.e.*, the precipitation method; (2) flotation in fluids of certain specific gravity. The author's procedure

was to dilute the faeces in a conical vessel with 250–500 cc. of water, filter, and then fix the deposit obtained by Willis's flotation method on to filter paper. The deposit is washed off and placed in a fluid made up of Formol, 10 per cent., 500 gm., Lugol's solution, 5 per cent., 50 gm. and acetic acid 5 cc. He examined the faeces of 6 dogs experimentally infected with helminths and found the procedure useful for detecting ova of *Echinococcus granulosus*, *Trichuris* sp. and *Toxocara canis*. The author suggests (and hopes) that examination of the sweeping of huts by this method will help in estimating the epidemiology of hydatid disease.

H. Harold Scott

Fontana, V. P. Recherche des oeufs d'helminthes en vue de l'étude épidémiologique du kyste hydatique. [**Examination for Helminth Eggs in Relation to the Epidemiology of Hydatid Disease**] *Ann. Parasit. Humaine et Comparée.* 1954, v. 29, Nos. 1/2, 163–6, 2 figs.

Schiller, E. L. **Studies on the Helminth Fauna of Alaska. XIX. An Experimental Study on Blowfly** (*Phormia regina*) **Transmission of Hydatid Disease.** *Exper. Parasit.* New York. 1954, Mar., v. 3, No. 2, 161–6, 1 fig. [14 refs.]

"Experimental infection of microtine rodents with hydatid cysts through transmission of *Echinococcus* eggs by the blowfly (*Phormia regina*) has been demonstrated. The significance of flies as vectors of hydatid disease relative to the human economy in the arctic is discussed."

Hagberg, C. J. & Maizels, G. **Solitary Hydatid Cyst of the Uterus.** *South African Med. J.* 1954, June 12, v. 28, No. 24, 499–500.

Harada, F. **Investigations of Hookworm Larvae. II. On the Lateral Migration of Infective Larvae.** *Yokohama Med. Bull.* 1953, Oct., v. 4, No. 5, 288–93, 7 figs.

Infective larvae of *Ancylostoma caninum* (1,000–2,000) were placed in the centre of an agar plate 76 cm. in diameter. After 24 hours at 11–11·5°C. most of the larvae had migrated laterally 2–4 cm. from the centre, but a few reached 14 cm. Similarly at 28–29°C., the maximum distribution was between 4–6 cm. from the centre, while a few reached 36 cm. On a dry unglazed surface no migration occurred. Larvae placed on an agar plate and ringed round by a small quantity of sand did not migrate beyond this ring. They were seen to climb on the sand particles and then went no farther. Scratching the agar surface with a knife also arrested the migration. It is concluded that infective hookworm larvae do not migrate appreciably on the soil surface and that their spread can only take place by being carried by water. [See also this *Bulletin*, 1923, v. 20, 244, *bis.*; 1924, v. 21, 221.] *J. J. C. Buckley*

Gerritsen, T., Heinz, H. J. & Stafford, G. H. **Estimation of Blood Loss in Hookworm Infestation with Fe59: Preliminary Report.** *Science.* 1954, Mar. 26, v. 119, 412–13.

In hookworm infection more blood is lost by frank haemorrhage than is actually consumed by the parasites. Most authors agree that the first

mechanism—oozing of blood from the injured intestinal wall—is the more important of the two. As this blood loss is an unkown quantity a correlation between the number of hookworms and the amount of blood lost has always been seen to be very variable.

Three patients were studied by following the disappearance from the blood of intravenously injected red cells labelled with radioactive Fe and by measuring the rate of appearance of radioactive iron in the stools. The patients were then " wormed " and quantitative worm counts were made in the stools for the following 5 days. There was no correlation between worm load and blood loss. A control person without ankylostomiasis lost 0·7 ml. of blood per day, the 3 patients lost per day 9·5 ml. (368 worms), 14·1 ml. (63 worms) and 18·8 ml. (354 worms). This amounted to 0·026, 0·22 and 0·053 ml. of blood loss per worm per day respectively. *H. Lehmann*

Ishii, K. & Yanagisawa, T. **Structure of the Female Reproductive Organ of Pig** *Ascaris*. *Japanese J. Med. Sci. & Biol.* 1954, Feb., v. 7, No. 1, 95–109, 2 text figs. & 27 figs. on 3 pls.

Mille, R. Nouvelles recherches sur l'incidence des filarioses humaines au Nord-Vietnam. [**New Studies on the Incidence of Human Filariasis in North Vietnam**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 339–56, 1 map & 4 figs. on 2 pls. [32 refs.]

To obtain the best morphological pictures of microfilariae of *W. malayi* it is necessary to mix the drops of blood containing the embryos with a drop of saline containing chloroform. The latter anaesthetizes the microfilariae and thus prevents the " knotting " which takes place as an agonal phenomenon during desiccation of the film. The technique has been modified by Iyengar with menthol as the anaesthetic agent. From the data thus obtained a table of the generally accepted differential points between microfilariae of *W. bancrofti* and *W. malayi* has been drawn up. The present investigation on the incidence of filariasis was undertaken from March to September 1953 among prisoners and internees in the prison camps of Northern Vietnam. With the exception of a few regular soldiers from N. Annam and Cochin-China the great majority hailed from the Red River district and the central region of N. Vietnam.

Some 5,283 were examined of whom 4,781 were men and 502 women. As both the microfilariae concerned are nocturnal, thick drops of blood were taken between 10 p.m. and midnight. A table has been drawn up giving the proportions of each from various localities in the Red River Delta.

Out of 4,097, 111 were carriers of microfilariae of *W. bancrofti*. The endemic index was 2·7 per cent.; 367 were carriers of microfilariae of *W. malayi*, with an endemic index of 8·95 per cent. The total numbers of microfilaria carriers was 478 with a global endemicity of 11·6 per cent.

In the Provinces of the Central region the total for 1953 was 1,129 of whom 27 were carriers of microfilariae of *W. bancrofti*. The endemic index was 2·39 per cent. Seven were carriers of microfilariae of *W. malayi*, with an endemicity index of 0·62 per cent. The total number of microfilaria carriers was 33 and the global endemic index 2·9 per cent.

The filarial endemicity of *W. bancrofti* has shown no change as the figures given by Galliard in 1937 [this *Bulletin*, 1938, v. 35, 387, 388, 762] are comparable with those obtained in this enquiry. In Hanoi, Kie Nam

Haiphong or Bac Giang, Phu Lang Thuong, where the conditions for transmission are optimal owing to the great numbers of breeding sites of *Culex fatigans*, the close similarity of the figures is quite remarkable, *viz.*, from 6 to 7·3 per cent.

When the relationship of filariasis to the density of the population is considered it is evident that in the Red River Delta the 2 per cent. microfilaria rate in the population of 7 million persons constitutes a focus of endemicity numerically more important than that of the Central or Upper regions, where, although the microfilaria rate is higher, the population does not number more than 1½ million.

Filariasis due to *W. bancrofti* does not appear to constitute an endemic focus of great activity, nor does it appear to be extending its range.

The clinical disabilities produced by this infection are limited to the urogenital region; this appears to be specific character of the infection and has no connexion, apparently, with its intensity or the length of time it has lasted.

The picture presented by *W. malayi* infections is quite different. This infection is especially severe in the Red River district and attains its maximum in an area limited on the north by the Canal des Rapides and on the west by the Red River and on the east by Song Kinh Mon. In the rural population of the Delta of the Red River there are areas of hyperendemicity of *W. malayi*: there the clinical manifestations are lymphangitis, fugitive oedema and elephantiasis. The contrasts in the density and manifestations of filarial disease bear some resemblance to the comparable problem of Pacific filariasis due to *W. bancrofti* var. *pacifica*. *Philip Manson-Bahr*

Krishnaswami, A. K. & Raghavan, N. G. S. **Vectors of Filarial Infections in India and the Far East.** *Bull. Nat. Soc. India for Malaria & other Mosquito-Borne Dis.* 1954, Mar., v. 2, No. 2, 57–70. [Numerous refs.]

This paper reviews briefly the work done up to date on the bionomics of filarial vectors in India and the Far East. Notes on their control also are included.

The only two pathogenic filariae affecting human beings in these regions are *Wuchereria bancrofti* and *W. malayi*; however, several kinds of animal filariae have been reported from garden lizards, crows, dogs, cattle, horses and monkeys in different parts of India. Brief notes are given on the larval habitats and feeding and resting places of the adults of *Culex fatigans*, *Aëdes* (*Stegomyia*) *polynesiensis* and *Mansonioides* spp., (*annulifera*, *uniformis*, *indiana* and *longipalpis*), the 3 most important vectors of human filariae in India and the Far East.

From the work of different observers, the authors have compiled tables showing the natural and experimental infection rates of various species of mosquitoes with *W. bancrofti* and *W. malayi*. *M. G. R. Varma*

Muirhead-Thomson, R. C. **Differential Biting Habits of the Vectors as a Factor in the Age Distribution of Mosquito-Borne Filariasis.** *J. Trop. Med. & Hyg.* 1954, May, v. 57, No. 5, 107–12. [21 refs.]

Although, occasionally, microfilariae of *Wuchereria bancrofti* are recorded from very young children there is, as a rule, no blood infection in young

children even in areas of high vector density and high infection rates in the adult population. Recalling the observations that certain anophelines have been shown to feed less on infants and young children than on older children and adults [this *Bulletin*, 1951, v. 48, 704; 1952, v. 49, 359], the author discusses the possibility of similar selective habits by vectors of mosquito-borne filariasis accounting for the low incidence of microfilaraemia in young children. There then follows an interesting consideration of the incidence curves of microfilarial infections in man in relation to the species (or genus) of the mosquito vector concerned. This not only provides some support for the view put forward but indicates gaps in our knowledge of the habits of certain vectors which might usefully be studied. There is need to consider not only selective biting by age but the relative attraction to mosquitoes of men and women, who are known to show appreciable differences in filarial incidence [this *Bulletin*, 1944, v. 41, 600; 1948, v. 45, 807; 1953, v. 50, 45]. Moreover, investigations of this kind on the different vectors of mosquito-borne filariasis throughout the world may help to explain the different incidences of mosquito-borne filariasis in children in different parts of the world. *D. S. Bertram*

Touzé, M. Présence d'amas microfilariens encapsulés dans le liquide d'hydrocèles à *Wuchereria bancrofti*. Six cas observés aux Iles Wallis. [**Encapsulated Masses of Microfilariae in Hydrocele Fluid in Six Cases of** *W. bancrofti* **Infection in the Wallis Islands**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 2, 284–6.

Certain bodies were found in hydrocele fluid which have not been previously described in genital lesions of filariasis. In the Wallis Islands hydroceles frequently contain living microfilariae of *W. bancrofti*, but in 6 out of 65 patients operated on, these bodies were found floating in the cavity. They were composed mainly of encapsulated masses of microfilariae and they occurred mostly in those of 3–12 years' duration.

The hydrocele sac itself is usually thickened and sometimes cretaceous, with atrophy of the epididymis. *Philip Manson-Bahr*

Lapeyssonnie, L., Masson, J. & Moignoux, J. B. Dermatose papulo-nodulaire hyperkératosique d'origine filarienne. [**Papulo-Nodular Hyperkeratotic Dermatitis of Filarial Origin**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 961–6, 3 figs. on 2 pls.

This eruption was originally studied in the region of the Volta basin. A recent case, however, was seen in France, the patient being an African soldier of 25, a groom in civil life, from French Guinea. Slight pruritus occurred originally, later lesions were non-pruritic and fell into 3 categories:—(1) a small papule, skin-coloured or slightly reddish, non-pruritic, with no associated excoriation marks; (2) a larger lesion the size of a pea or cherry produced by increase in size of the smaller papule or contiguity of adjacent lesions; (3) hyperkeratosis confined to the lesions and giving the epidermis a greyish tinge with depigmentation of a small area of surrounding skin; (4) after 3 months the hyperkeratosis disappeared and the epidermis became more deeply pigmented, varying from dark blue to the colour of Indian ink.

Laboratory investigations showed no mycelium or treponemata in

scrapings from the lesions, negative serological reactions and no other abnormality except for helminth ova in the stools and *Wuchereria bancrofti* embryos in nocturnal blood.

Histologically there is seen some hyperkeratosis, hyperplasia of the interpapillary processes, and an inflammatory infiltrate confined to the dermal papillae. Melanin can be seen chiefly in the basal layer. The infiltrate consists of numerous histiocytes, a few lymphocytes, many eosinophiles and a number of macrophages with melanin within their cytoplasm. There is no evidence of ulceration.

In younger lesions microfilariae may be seen within and at the edge of the inflammatory infiltrate. The different character of the infiltrate, which is composed of histiocytes and eosinophiles rather than lymphocytes and plasma cells, the presence of microfilariae (*Onchocerca volvulus*) and absence of treponemata together with the negative serological reactions, distinguish this condition from yaws and syphilis.

It is interesting that all of 39 African patients referred to by the authors attributed the disorder to the presence of horses, calling it *so-bana* or the disease of horses. It was noticed, moreover, that outbreaks occurred during the rains when *culicoides* were prevalent. It is known that they are capable of transmitting the horse *Onchocerca* and it is possible that domestic animals form a reservoir for this disease which may be transmitted by other insects besides *Simulium*. *H. T. H. Wilson*

Crosnier, R., Darbon, A., Moras, P. & Laurens, L. Nouvelles observations de filariose lymphatique à *W. malayi* chez des rapatriés d'Indochine. [**New Observations on Lymphatic Filariasis due to** *W. malayi* **in Repatriates from Indo-China**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 87–91.

This paper is an amplification of the description of the new syndrome given by Friess, Pierrou and Segalen (*Bull. Soc. Path. Exot.*, 1953, v. 46, 1037) which is due to infection with *Wuchereria malayi* in soldiers repatriated from Indo-China. This syndrome is characterized clinically by superficial adenopathies, marked eosinophilia and asthmatic bronchitis.

There were only 4 cases in the present series, and only one patient in whom there were asthmatic manifestations. All were infected with *W. malayi*. The very considerable eosinophilia and hyperleucocytosis approximated to the blood condition present in tropical eosinophilia. In one instance the leucocytosis was 36,000 per cmm. with an eosinophile percentage of 70, and it is claimed that this high figure was reduced with Notézine [diethylcarbamazine] treatment. *Philip Manson-Bahr*

Friess, J., Pierrou, M. & Segalen, J. De certaines formes cliniques de la filariose lymphatique (*W. malayi*); relations avec les éosinophilies tropicales. [**Clinical Forms of Lymphatic Filariasis due to** *W. malayi* **and their Relation to Tropical Eosinophilia**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1037–63, 4 figs. on 2 pls.

Some young soldiers returning from Indo-China during the last 3 years have been suffering from a syndrome evident as an adenopathy, eosinophilia, and asthmatic bronchitis. The clinical condition broadly conformed to that known as tropical eosinophilia, but its genesis in the cases here described appears to be a filarial infection. The glandular involvement was

found on biopsy to be associated with a *Wuchereria malayi* infection; numerous microfilariae of this species were recovered from the enlarged glands, though none could be demonstrated in day or in night blood, and an intradermal test with a filarial antigen gave a negative response.

Details are given of 6 cases, each presenting as a salient feature one or other of the manifestations of the syndrome. They are recorded under the headings superficial adenopathy, eosinophilia, bronchitis, asthma, labile infiltration, and acute lymphangitis. The first of these patients suffered from considerable glandular swelling in the right axilla, but only minor lymphatic gland enlargements elsewhere; he had chronic bronchitis and some nocturnal dyspnoea; and a white cell count of 17,300 per cmm. with 56 per cent. eosinophilia. The second was noticed to have eosinophilia of 33 to 61 per cent.; he gave a history of asthmatic episodes; he had only slight lymphatic gland enlargements in various places. The third suffered from episodes of acute bronchitis; he had some slight lymphadenitis and eosinophilia of 78 per cent. in a white cell count of 13,600 per cmm. The fourth gave a history of asthmatic dyspnoea and cough; he had marked physical signs in the chest, eosinophilia of 28 per cent. in a 14,800 per cmm. white cell count, and very slight polyadenitis. The fifth was in hospital on account of bronchitis, with marked infiltration of the right lung on X-ray examination; he had some lymphadenitis and eosinophilia ranging from 14 to 29 per cent. in a leucocyte count of 10,200 to 14,500 per cmm. The sixth suffered from recurring oedema of the left arm, and also bronchitis. He had a very slight generalized lymphadenitis, and eosinophilia of 7 per cent. in a white cell count of 7,400 per cmm.

From all these 6 patients microfilariae of *W. malayi* were recovered on gland biopsy. Details are given of the histories, symptomatology, and pathological examinations of the patients. The predominant clinical types of the condition, their diagnosis, and the differential diagnosis are discussed. Treatment with Notézine [diethylcarbamazine] is advocated as being effective; treatment with other drugs was ineffective. *A. R. D. Adams*

Kanakaraju, T. **Modified Kondoleon Operation for Elephantoid Legs.** *New England J. of Med.* 1954, Apr. 22, v. 250, No. 16, 691–2, 2 figs.

In 1874 Sappey observed that the deep fascia forms an impenetrable barrier to the exchange of lymph between the superficial and deep lymphatic systems in elephantiasis. The thickened tissues are superficial to the deep fascia and their abundant overgrowth is due to the nourishment derived from the stagnated lymph.

Kondoleon's operation consists of excision of strips of deep fascia and subcutaneous tissue and closure of the wound. The reduction in size is not great and the cosmetic result is poor. The author performs his modification of the operation under spinal anaesthesia with 8–10 ml. of 1 in 1,500 Nupercaine, which lowers blood pressure and minimizes bleeding. After application of a tourniquet to the mid-thigh region, large Thiersch grafts are cut from the skin over the elephantoid tissues and preserved in saline. Through suitable incisions the whole of the elephantoid tissue is excised along with the deep fascia from both anterior and posterior aspects of the limb. The tourniquet is released and the bleeding points are controlled by ligature or hot packs and pressure. The raw surface is dusted with sulphonamide powder, penicillin solution 100,000 units in 10 ml. of water is applied and the whole area is covered with skin grafts, kept spread by stitches where necessary. The dressing consists of large sheets of vaseline

gauze, over which an occluding plaster-of-paris is applied and removed 10–12 days later. Elastic bandages are worn for a month. [The number of cases is not stated, nor the results some months later.] *W. L. Harnett*

Nicholas, W. L. **The Dispersal of *Culicoides grahamii* and *C. austeni* from their Breeding-Sites prior to their taking a Blood-Meal.** *Ann. Trop. Med. & Parasit.* 1953, Oct., v. 47, No. 3, 309–23, 4 text figs., 4 graphs & 3 figs. on pl. [10 refs.]

Culicoides species do not usually disperse far from their breeding site but are known to be troublesome biters up to a distance of 5 miles in the direction of the prevailing wind. In the British Cameroons *Culicoides grahami* and *C. austeni* were found to be biting at a distance of 400 yd. from the breeding site, the greatest distance at which observations were made.

Three experimental areas were chosen for study on the Victoria-Kumba road. Each dispersal area was covered with short grass devoid of trees and bushes and adjoined along an approximately straight line an extensive breeding site of abundant rotting vegetation found in plantain and banana plantations. The biting density was estimated from catches made by fly boys within the breeding sites and at various distances from them.

Analysis showed that the biting density for *C. grahami* fell to 1/10th of its initial value within the breeding site, at a distance between 250–700 yards. There appeared to be a linear relationship between the logarithm of biting density and the distance from breeding site. The author considers that better results might have been obtained by a different design of experiment.

It is suggested that the dispersal of *C. grahami* in clearings differs radically from that in forests. *M. C. Williams*

i. Kettle, D. S. **The Effect of Light on the Biting Activity of *Chrysops silacea* (Diptera, Tabanidae).** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 335–9, 2 figs.

ii. Crewe, W. **The Effect of Light on the Biting Activity of *Chrysops silacea* in the Forest at Kumba, British Cameroons.** *Ann. Trop. Med. & Parasit.* 1953, Dec., v. 47, No. 4, 340–43, 1 fig.

Working in the Kaki Gorge, Kumba, British Cameroons, Crewe and O'Rourke [see this *Bulletin*, 1951, v. 48, 907] described the biting activity of *Chrysops silacea* in the forest. The daily biting cycle was bimodal with a mid-day diminution of activity in the period April to June.

i. Kettle has made a theoretical calculation of the light intensity cycle, allowance being made for the direct sunlight, reflected sunlight and skylight. The shape of the Kaki gorge reduces direct sunlight soon after midday but allows an increase of reflected sunlight 2 hours later, giving the calculated intensity of illumination a bimodal distribution. Comparison reveals a close correlation between the calculated intensity of illumination and the biting activity of *C. silacea* at canopy level. The correlation with the observation made at ground level is not so close.

ii. Crewe, using a Weston " Master " universal exposure meter, has made field measurements of the light intensity at ground level and at canopy level in the Kumba forest during 2 days in November. The results obtained do not show a marked bimodal distribution. It is suggested that the correlation

between Kettle's light intensity cycle and the biting cycle of *C. silacea* may be explained by assuming that the normal habitat of *C. silacea* is above the forest canopy. *M. C. Williams*

Browne, S. G. Zona bilatéral provoqué par la *Loa-loa*. [**Bilateral Lesions caused by** *Loa loa*] *Ann. Soc. Belge de Méd. Trop.* 1954, Jan. 28, v. 34, No. 1, 5–8.

The following is a translation of the author's summary:—

The author describes a case of *Loa loa* infection which presented strictly symmetrical herpetiform lesions on the neck (vesicles on the right, papules on the left) corresponding partly to the area of the third cervical segment: during the development of the cutaneous lesions on the left side, a *Loa loa* emerged from the deep tissues near the third cervical vertebra. The author suggests that these herpetiform lesions might have been provoked by the filaria through mechanical irritation of the corresponding posterior nerve ganglia. *H. J. O'D. Burke-Gaffney*

Crosskey, R. W. **Onchocerciasis in the Galma Valley Area, Northern Nigeria.** *West African Med. J.* 1954, June, v. 3 (n.s.), No. 2, 75–9.

The author surveyed an area of about 1,000 sq. miles, stretching along some 50 miles of the Galma River between Soba and the river's source near Kayerda, and about 20 miles wide astride the river. About half this area of flat country was cultivated and the rest savannah woodland, 2,300–2,500 ft. above sea level, rising in the south-east to 4,040 ft. The area is inhabited mainly by Hausas, who live parallel to the river and a few miles from it. The only known vector of onchocerciasis in West Africa is *Simulium damnosum*, which is abundant along some stretches of the Galma River, breeding where there are rapids.

Dissection of 1,200 female flies showed that the development of *Onchocerca* proceeds as Blacklock [this *Bulletin*, 1926, v. 23, 762 *bis.*] showed and that 20 per cent. of the flies were infected at the height of the rains. Of more than 13,000 female flies obtained by the offer of human bait only 1 belonged to another species, namely, *Simulium bovis* and this is the only established record of this species biting man. Thus *S. damnosum* is the vector of onchocerciasis in this area, as it is elsewhere, and it is probably the only vector in the Galma valley.

The author examined 3,008 persons and of these 1,116 (37·1 per cent.) showed microfilariae in skin snips taken from the waist, one per person, 318 (10·6 per cent.) had nodules and 32 (1·1 per cent.) were totally blind. Blindness, except for one boy, was restricted to persons of middle or advanced age, but it was not possible to determine the exact cause of the blindness. The number of microfilariae per visual field was 1 to 30, average 3·5. Microfilariae were found in 43 per cent. of female persons and in 21 per cent. of males, but nodules were found in approximately 13 per cent. of males and in 4 per cent. of females. Thus microfilariae were commoner in females and nodules in males. In 86 (27 per cent.) of 318 persons with nodules no microfilariae were found in skin snips. Both nodules and microfilariae were commoner in adults, but in one village 9 out of 40 boys had nodules and 18 had microfilariae; and of 16 girls 4 had microfilariae and 1 (aged 8) had a nodule. In almost all persons examined the nodules were on the trunk, but one was noticed on the knee and one on the scalp. Scalp nodules are apparently rare in Nigeria.

Tables give the results of a study of the age and sex incidence of nodules and microfilariae. Positive skin snips were as follows:

Table II.—Microfilarial infection according to age and sex

	Males			*Females*			*Total Males*	*Total Females*
Age	3-15	16-45	Over 45	3-15	16-45	Over 45		
Examined	586	1,258	259	346	512	47	2,103	905
Positive Skin-snips	92	709	119	27	156	13	920	196
Percentage with Positive Skin-snips	15.7	56.4	45.9	7.8	30.5	27.7	43.7	21.7

Age grouping was difficult because of the ignorance of the people of their ages and other factors explained by the author.

Accurate maps made it possible to study the incidence in relation to the distance from the river where the flies breed. A table of the results shows the incidence:

Table III (Modified).—Infection in relation to distance from River Galma

Miles from Galma River	*Persons Examined*	*Microfilariae*	*Nodules*	*Total Blindness*
		% With	% With	% Cases
0–2.5	639	39.9	13.3	1.1
2.5–5	674	48.2	15.7	0.7
5–7.5	911	41.3	10.3	1.4
7.5–10	324	25.9	6.2	1.8
10–12.5	460	16.5	2.8	0.26

The author compares his results with those of Barnley [this *Bulletin*, 1950, v. 47, 645] who found, in the new onchocerciasis focus in the Kigezi district, Uganda, that 67 per cent. of 1,847 patients had microfilariae in skin-snips, 10 per cent. had nodules and 5 per cent. were blind. This district is mountainous with dense forest and rapid streams and the vector suspected is *S. neavei*, the habits of which are very different from those of *S. damnosum*.

The author also compares his results on the relation between incidence and distance from the fly's breeding grounds with those of Kirk [this *Bulletin*, 1948, v. 45, 531] who found, in the Sudan, 25 per cent. of patients infected 8 miles from the Sue River and 76 per cent. infected near the breeding grounds; and those of Wanson *et al.* [this *Bulletin*, 1946, v. 43, 233] who found, near Léopoldville, 90 per cent. infected near the fly's breeding grounds, 25–29 per cent. infected 6–10 miles from these and 14–15 per cent. infected

16–19 miles from them. The distance that *S. damnosum* can fly is shown by the facts that, in the Galma valley, the author found infected, but not infective, *S. damnosum* 7 miles from the Galma River, and Lewis [this *Bulletin*, 1953, v. 50, 543] found, in the Sudan, infected flies 7 and 12 miles from the Sue River. *G. Lapage*

See also p. 1081, Lapeyssonnie, Masson & Moignoux, Dermatose papulo-nodulaire hyperkératosique d'origine filarienne [**Papulo-Nodular Hyperkeratotic Dermatitis of Filarial Origin**]

Mazzotti, L. Desaparición de la reacción alérgica al hetrazán, en cinco casos de oncocercosis. [**Disappearance of Allergic Reaction to Diethylcarbamazine in 5 Cases of Onchocerciasis**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 279–83. English summary (8 lines).

Mazzotti, L. Supervivencia de las microfilarias de *Dirofilaria immitis* y de *Onchocerca reticulata* a la temperatura de 25°C. bajo cero. [**Survival of *Dirofilaria immitis* and of *Onchocerca reticulata* at a Temperature of 25°C. below Zero**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 289–91.

The English summary appended to the paper is as follows:—
"Microfilariae of *Dirofilaria immitis* and *Onchocerca reticulata* remained alive during 18 and 10 days respectively, at a temperature of 25° centigrade, below zero."

Winkler, W. F. Oxyuren—und kein Ende. [**Thread Worms without End**] *Ztschr. f. ärztl. Fortbildung.* 1954, Mar. 1, v. 48, No. 5, 164–6.

This readable paper deals mainly with the biology and modes of transmission of *Enterobius* which is the most widespread of all the worm infections of man. All other worm infections, with the occasional exception of that with *Ascaris*, have ceased to have importance in Germany. Investigations by various methods have shown that the incidence of thread worms is very rare at 2 months of age, increases to about 5 per cent. at the end of 12 months but then rises steeply to over 80 per cent. at 6 years of age. The reduction of these figures is a real necessity and although the methods and precautions which will certainly reduce or eliminate re-infection and retro-infection are arduous there is no doubt that they could and should be enforced. *M. E. Delafield*

Brown, H. W., Chan, K. F. & Hussey, K. L. **The Efficacy of Piperazine Compounds against *Syphacia obvelata*, a Pinworm of Mice.** *Amer. J. Trop. Med. & Hyg.* 1954, May, v. 3, No. 3, 504–10. [11 refs.]

"The activity of thirty-two piperazine compounds has been tested against *Syphacia obvelata* in mice, and several of them exhibited considerable anthelmintic activity. In general, the simple piperazine base and its salts appear to be more effective against *Syphacia* than are the more complex substituted compounds which were studied. Mature stages of the worm are more vulnerable to piperazine than the immature stages."

Larsh, J. E., Jr. & Race, G. J. **A Histopathologic Study of the Anterior Small Intestine of Immunized and Nonimmunized Mice infected with *Trichinella spiralis*.** *J. Infect. Dis.* 1954, May–June, v. 94, No. 3, 262–72, 12 figs. [15 refs.]

"The experimental mice given four stimulating infections and controls not infected previously were inoculated with a challenging dose of *Trichinella spiralis* larvae. Seven days later some of the mice of both groups were necropsied. Counts of the numbers of adult worms in the small intestine proved that the experimental mice had developed immunity, and the precipitin titers were those expected from previous work.

"The remaining mice in both groups were necropsied at intervals after the challenging infection for histopathologic studies of the anterior half of the small intestine, the only location in which the defensive mechanisms operate effectively in old mice.

"The difference in the inflammatory response of the immunized and nonimmunized mice was one of time and severity. Inflammation of a mild degree was evident in the immunized mice at 12 hours postinfection, and it reached a peak at 4 days. By contrast, little or no inflammation was evident in the controls before 4 days, and the peak was not reached until 8 days. The worms in the intestinal tissue of the immunized mice were smaller and less well developed than those of the same age in the controls.

"In both groups of mice, the peak of the inflammatory response occurred shortly before a significant loss of worms was noted from the same area of the intestine in comparable groups of an earlier study. Evidence is presented in the *Discussion* for the suggestion that in old mice the immunity to reinfection with *T. spiralis* results from the direct effects of a humoral factor(s) and to indirect effects of cellular reactions associated with the resulting inflammation."

DEFICIENCY DISEASES

Food and Agriculture Organization of the United Nations. **FAO Nutritional Studies No. 12. Rice Enrichment in the Philippines** [Aalsmeer, W. C., Mitra, K., Simpson, I. A. & Obando, N. (De, S. S., Technical Secretary)]. pp. v + 109. [38 refs.] Rome: 1954, Mar. [$1.00; 5s.]

Beriberi has long been an important public health problem in the Philippines. After the end of the Japanese occupation, a novel attempt was made to stamp out the disease by artificially fortifying the rice with thiamine and other nutrients. In October 1948 an experimental introduction of enriched rice began in 7 municipalities in the Bataan Province. The death rate from the disease in these municipalities dropped from 186 and 193 per 100,000 in 1947 and 1948 respectively to 20 and 21 in 1950 and 1951. There was a decline in mortality from the disease in other areas in the Philippines, but on an altogether smaller scale. Full details of this important experiment have been published by Professor J. Salcedo and his colleagues [see this *Bulletin*, 1950, v. 47, 560; 1951, v. 48, 494]. It was concluded that enrichment of rice was an important and practical measure for the prevention of beriberi. In consequence, in February 1951 enriched rice was introduced on a commercial basis throughout the Bataan Province and later in the neighbouring Tarlac Province. On 14th August 1952 the Congress of the Republic of the Philippines passed an Act to

regulate the sale of rice. This Act is very vague both in its aims and terminology, but it gives the Secretary of Health authority to issue rules and regulations, which could profoundly affect the rice trade and which might [so it appears to the reviewer] enable him to be able virtually to enforce enrichment on the trade.

In the early months of 1952 a team consisting of 2 physicians, a biochemist and an agricultural chemist (Dutch, Indian, British and Colombian by race) was sent to the Philippines under the auspices of FAO and WHO, charged with investigating the results of the enrichment experiment and of considering the practicality of enrichment in other rice-eating countries. The Philippine Government gave the team every facility.

In brief the team were impressed by the evidence of the benefit derived from enrichment. A general rise in the economic level of the people and an extensive public health campaign with health education reduced the value of the control figures. However, in a large field experiment the difficulties are so great that it would be unrealistic to wait upon standards of proof which the laboratory experimentalist properly demands. The team appear to be satisfied that the enrichment in the experimental municipalities in Bataan was responsible for saving many lives.

The team point out two objections to the extension of an enrichment policy to other rice-eating countries. The first is that most such countries would be dependent on outside sources both for the chemicals needed for enrichment and the necessary mechanical equipment for the processes. These might be an important financial drain on a country and in addition the supplies would be liable to the uncertainties of war. Professor Salcedo in an appendix points out that the cost of imports to cover the requirements of vitamins for 3,000,000 persons (about one-seventh of the total population of the Philippines) amounts to only 0·05 per cent. of the total expenditure of the country on imports. He also very properly adds that an important health measure should always take a chance on world trade.

The second objection appears more serious. In discussion of the technical problems of adding the vitamins, the team state: "the difficulties in the mills arise partly out of the somewhat unsatisfactory construction of the premix feeders and partly from the inexperience, negligence, carelessness and possibly at times, dishonesty of the millers. To overcome them, an elaborate system of control and inspection of all mills would be essential". Clearly the enforcement of any enrichment policy would be a very difficult problem. The team left the Philippines before Congress passed the Act to regulate the sale of rice and they do not comment on it. A practical difficulty of any legislative measure is the fact that the estimation of the thiamine content of a sample of rice requires time, skill and equipment only available in the best laboratories. There is no simple field method of assay. In fact the practicability of enrichment as a large-scale measure is seriously in doubt.

The team end their report by stating that great credit is due to the Philippines for introducing enriched rice and carrying out the extensive trials, but they are very cautious in advocating an extension of enrichment and properly point out the many obstacles.

[There appears to be one important omission from the report. The team state that in the mortality figures from the Philippines 80–90 per cent. of the deaths were ascribed to infantile beriberi. Whereas the diagnosis of adult beriberi is usually simple, the diagnosis of infantile beriberi is often, indeed usually, difficult. It is well known that in all parts of the world the medical profession is subject to fashions in diagnosis on death certificates. Even with great skill and care accurate diagnosis of the exact cause

of death of infants in an area where beriberi is endemic must be uncertain. This must add further doubt to the reliability of the published figures of mortality. However, a study of the total infant mortality in the experimental and control areas might have enabled a more accurate assessment of the value of the enrichment policy to be made. Presumably these figures were available; if so, the team overlooked them.

This report is full of evidence of clear, straight, scientific thinking on a subject of international importance. The members of the team and its sponsors are to be congratulated on providing a real example of what the technical agencies of the United Nations can achieve in international cooperation.] *R. Passmore*

Wilson, Dagmar C. **The Nutrition of Schoolgirls in Northern Nigeria.** *Brit. J. Nutrition.* 1954, v. 8, No. 2, 83–9, 1 fig.

A summary of the customary dietary pattern of 6 races of Northern Nigeria and of Southern immigrants is given. Clinical examination of schoolgirls revealed roughness of the skin and seborrhoea in 18 to 32 per cent. of children, gums which were red, swollen or bleeding in 18 to 48 per cent., conjunctivitis or xerosis conjunctivae in 7 to 20 per cent. The thyroid gland was visible at rest in from 7 to 21 per cent. of girls. Dental caries and fluorosis were also common.

Suggestions are given for improving the diets of schoolchildren.

R. Passmore

Kahn, E. **A Neurological Syndrome in Infants recovering from Malnutrition.** *Arch. Dis. in Childhood.* 1954, June, v. 29, No. 145, 256–61, 2 figs.

Among 1,000 cases of infant malnutrition admitted to a hospital in Johannesburg, 8 patients developed neurological disturbances. All were boys aged between 12 and 22 months. The signs consisted of tremors, similar to those seen in Parkinsonism, cogwheel rigidity and exaggerated tendon reflexes. Some infants showed myoclonus and opisthotonus. These signs developed from 1 to 8 weeks after the children had been receiving a diet rich in protein, but perhaps inadequate in vitamin content, but all were showing signs of improvement in their nutritional state. In all cases the syndrome disappeared entirely or nearly so, within a few weeks. Possible infective or toxic causes for the disturbances are discussed, but ruled out. It is suggested that the disturbances may arise from an unbalanced therapeutic régime. *R. Passmore*

Stanier, Margaret W. & Holmes, E. G. **Malnutrition in African Adults. 1. Serum Proteins, Cholinesterase, and Protein-Bound Lipid.** *Brit. J. Nutrition.* 1954, v. 8, No. 2, 155–64, 5 figs. [21 refs.]

Fourteen adult African men were admitted to hospital in Uganda complaining of weakness, breathlessness and palpitations, and swelling of the ankles. Previous to admission they had subsisted mainly on cassava, plantains and sweet potato. There had been a gross inequality between caloric intake and protein intake. They were put on a high protein diet (approx. 180 gm./day). The serum albumin levels on admission were low, range 0·63–3·00 gm./100 ml. with a mean value of 1·56. The values rose under treatment, as also did the pseudo-cholinesterase in the serum. Pseudo-cholinesterase levels, it is suggested, reflect the ability of the liver

to synthesize protein. Globulin levels were high initially, but changes during treatment were not consistent. Less lipid could be extracted with frozen ether from the serum proteins of the malnourished than from the serum of normal persons. *R. Passmore*

Holmes, E. G., Jones, E. R. & Stanier, Margaret W. **Malnutrition in African Adults. 2. Protein Storage.** *Brit. J. Nutrition.* 1954, v. 8, No. 2, 173–93, 5 figs. [23 refs.]

This paper records nitrogen balances on African men in Uganda who had lived for a long time on diets very deficient in protein. On a diet high in protein and calories they retained nitrogen at rates of up to 10 gm./day continuously for months. Thus one subject, Gabriel, over 109 days retained 793 gm. of nitrogen. This is equivalent to 4·96 kgm. of protein: yet the gain in body weight was only 2·1 kgm. Other similar records are given in which the nitrogen retention over many weeks is large and the corresponding gain in body weight small. [The authors have been at great pains to check their technique and have carried out numerous balances on Europeans and healthy Africans, when equilibrium has been obtained.] These results indicate that the body can lay down protein over many weeks with no corresponding increase in either extracellular or intracellular water or of fat. Indeed in some subjects there would appear to have been a loss of these components. There seems to be little doubt that protein deficiency followed by overfeeding produces fundamental alterations in the proportion of the body constituents. A labile store of protein seems to be indicated.

This retention of nitrogen was markedly reduced by large doses of cortisone, which suggests that nitrogen metabolism was under hormonal control.

R. Passmore

Arens, L. & Brock, J. F. **Some Aspects of the Serum Protein Pattern of Africans.** *South African J. Clin. Sci.* Cape Town. (Incorporating *Clin. Proc.*) 1954, Jan., v. 5, No. 1, 20–34, 2 figs. [24 refs.]

This paper records a study of the chemical fractionation of the serum proteins of 100 Cape Bantu subjects. Values for European subjects in Cape Town are also reported and the results compared with a similar survey carried out in Kampala, East Africa, by Holmes *et al.* [this *Bulletin*, 1952, v. 49, 535]. A summary of the results is as follows, all values being gm./100 ml.

	Africans		Europeans	
	Cape Town	Kampala	Cape Town	Kampala
No. of subjects ...	100	86	20	30
Total protein	8·24	7·60	7·63	7·31
Albumin	3·55	3·27	4·27	4·25
Globulin (total) ...	4·69	4·33	3·36	3·06
α globulin	1·54	1·60	1·24	0·91
β globulin	1·89	0·78	1·29	1·09
γ globulin	1·36	1·98	0·84	1·03

The European values are not considered to be significantly different from each other and the general agreement is taken as a confirmation that the chemical techniques of the two groups were similar and satisfactory. In Cape Town the Africans were mostly from the Transkei, where there is

freedom from malaria, trypanosomiasis, kala azar and filariasis, whereas in Kampala malaria is endemic and other tropical diseases occur. The high γ globulin level in Africans from Kampala is attributed to the tropical disease. The other differences between the figures for Africans in both areas and Europeans cannot be attributed to tropical infections. These differences are not necessarily genetic. Prolonged protein malnutrition and latent liver disease have to be excluded as causative factors.

R. Passmore

Bersohn, I. & Wayburne, S., in association with H. Hirsch & C. D. Sussman. **A Comparison of the Serum Protein, "Liver-Function Tests" and Serological Tests for Syphilis in New-Born African and European Infants and their Mothers.** *South African J. Clin. Sci.* Cape Town. (Incorporating *Clin Proc.*) 1954, Jan., v. 5, No. 1, 35–44. [15 refs.]

This paper records data from Johannesburg. A summary of the mean values for serum proteins, expressed in gm./100 ml., is as follows:

	Infants		Mothers	
	Africans	Europeans	Africans	Europeans
No. of subjects ...	85	67	84	66
Total protein	6·21	5·97	6·36	6·27
Albumin	3·71	3·59	2·96	3·23
Total globulin ...	2·29	2·39	3·45	3·08
γ globulin	1·09	0·93	1·21	0·97

No significant differences were found in serum bilirubin levels, thymol turbidity test and Takata Ara reaction between the two races. The Africans showed, however, a higher mean level of serum alkaline phosphatase both in the infants and mothers. Serological tests for syphilis gave positive results in 10 per cent. of African infants and 26 per cent. of African mothers, but were negative in all Europeans.

These results are all presented with full statistical details. It is suggested that poor nutrition rather than genetic factors are responsible for the racial differences. *R. Passmore*

Patwardhan, V. N. **Nutrition in India.**

This book was reviewed on p. 1018.

SPRUE

Suárez, R. M., Suárez, R. M., Jr., Busó, R. & Sabater, J. **The Effect of Orally Administered Folinic Acid in the Treatment of Tropical Sprue.** *Blood.* 1954, May, v. 9, No. 5, 489–95, 5 figs.

On the basis of microbiological assay naturally occurring folinic acid (citrovorum factor) appears to be 15 times as effective as folic acid in reducing the toxicity of methyl folic acid for *Lactobacillus casei*.

Girdwood (*Blood*, 1953, v. 8, 469) found 10 times as much citrovorum factor as folic acid in the liver of normal persons and suggested that storage normally occurs as citrovorum factor (folinic acid).

Sprue patients of the older age group show either marked hypochlorhydria

or histamine-resistant achlorhydria. They all respond to orally administered folic acid in the usual dosage of 15 to 20 mgm. daily. In the present group of 5 cases, there were 2 with histamine-resistant achlorhydria and 2 with marked hypochlorhydria. The results obtained did not seem to differ between patients with total absence of free hydrochloric acid and those in whom it was present in small amounts in the gastric secretion. The first patient showed a poor response to all forms of medication; the other 4 gave a good or excellent clinical and haematological response to the oral administration of leucovorin (folinic acid) in doses of 15 mgm. daily, but the reticulocyte responses were not maximal. Taken as a whole, sprue patients respond better to anti-anaemic factors, when given an adequate diet, rich in animal proteins and low in fats and carbohydrates. *Philip Manson-Bahr*

HAEMATOLOGY

Poole, J. C. F. **Haemoglobin Standard.** *Lancet.* 1954, July 17, 116–17. [15 refs.]

"It is suggested, on the basis of evidence collected from published reports, that the British Standards Institution Haldane haemoglobin colour standard should be valued at 14·5 g. of haemoglobin per 100 ml. of blood instead of 14·8 g. per 100 ml. as has been customary hitherto."

Jordan, P. **Some Notes on the Haemoglobin Levels of Infants in the First Year of Life.** *East African Med. J.* 1954, Apr., v. 31, No. 4, 143–5, 1 graph.

The haemoglobin level of normal breast-fed children in London is known to fall from about 145 per cent. (Haldane) at birth to just over 70 per cent. at 3 months and to fluctuate between 70 and 80 per cent. for the remainder of the first year of life, to start rising again at the end of the 12th month [*Bull. Hyg.*, 1931, v. 6, 826]. The author examined infants attending the child welfare clinic at the Government Hospital in Mwanza, Lake Victoria. He found that infants without malaria parasites in their blood had a haemoglobin level not unlike that of the London children, but that those with parasites had a significantly lower haemoglobin level from 4 weeks of age onwards. These findings are in agreement with those made by Welbourn in Uganda [this *Bulletin*, 1953, v. 50, 60]. There was no correlation between the haemoglobin level of 44 mothers and that of their infants at birth. The author reports that the local midwives wait until the placenta has been delivered before they clamp the cord and quotes evidence (De Marsh *et al.*, *Amer. J. Dis. Children*, 1948, v. 75, 860) that this procedure leads to a higher haemoglobin level than that seen when the cord is clamped as soon as the pulsation has ceased. *H. Lehmann*

Adams, E. B. & Wilmot, A. J. **Megaloblastic Anaemia of Pregnancy and the Puerperium.** *South African Med. J.* 1953, Nov. 14, v. 27, No. 46, 1028–32. [17 refs.]

Megaloblastic anaemia associated with pregnancy is not seen frequently in Europe or in North America, yet it is common in India. There have been few reports from Africa. In Nigeria Woodruff [this *Bulletin*, 1952, v. 49, 301] found the macrocytic anaemia of pregnant women predominantly

macro-normoblastic. Among African and Indian women in Durban the condition is not rare. Within 12 months 34 cases of megaloblastic anaemia were seen at the King Edward VIII Hospital, of which 23 were associated with pregnancy or the puerperium. This paper describes the clinical and haematological features of 14 of these patients; 8 were Indians and 6 Africans, and the ages varied from 19 to 36 years. There was no clinical evidence of nutritional deficiency, though the serum protein level was below 6·0 gm. per cent. in 7 and the serum albumin below 3·5 gm. per cent. in 9. In 7 patients serum protein was again measured after the anaemia had been treated, and the values had risen appreciably in all. Haemoglobin values ranged from 2·15 to 5·15 gm. per cent.; the lowest packed cell volume was 7, the highest 18·8 per cent. In one case there was a red cell count of 535,000 per cmm.

The diagnosis was confirmed in all cases by the finding of megaloblasts in the bone-marrow smear or in the blood film. Serum bilirubin was within the normal range in 12 women and in the other 2 was 1·3 and 1·4 mgm. per cent. respectively. Twelve patients were given histamine and free acid was found in the stomach juice of 11. One woman died of pyelonephritis. Nine patients were treated with folic acid by mouth (10 mgm. 3 times daily), all of them responded with a satisfactory rise in haemoglobin and packed cell volume values, and 8 also showed a good reticulocyte response. Two were given folic acid and—intramuscularly—vitamin B12, and 2 were treated with vitamin B12 alone (40 and 50 μgm. respectively initially and afterwards 50 μgm. twice weekly). These patients too showed a satisfactory improvement. No patient was transfused. The beneficial effect of vitamin B12 is in keeping with Indian experience, but unlike the findings in Great Britain.

H. Lehmann

Gordin, R. **Prothrombin in Cryptogenetic Pernicious Anemia and Pernicious Tapeworm Anemia and its Response to Treatment.** *Acta Med. Scandinavica.* 1954, June 12, v. 149, No. 1, 1–18, 18 figs. [42 refs.]

The author examined 89 patients with pernicious anaemia, 47 of them of unknown origin and 42 caused by tapeworms. In the first group 78 per cent. of the patients with haemoglobin values below 60 per cent., and 75 per cent. of those with less than 2·5 million/cmm. red blood cells had a prothrombin value below 80 per cent. of normal. Of the second group the corresponding figures were 58 and 55 per cent. respectively. The author quotes a colleague who also found that the serum protein pattern in pernicious anaemia was changed and showed an increase in *gamma*-globulin and a decrease in albumin. From this the conclusion is drawn that in addition to the haemopoietic defect in pernicious anaemia there is a disturbance of liver function. Whereas the anaemia could be treated successfully with vitamin B12 or with preparations of tapeworm, neither of these 2 therapeutic agents nor vitamin K had an improving effect on the prothrombin value. However, unpurified liver extracts persistently raised the low prothrombin value to normal; according to the author this points to the presence of a specific factor in liver necessary for prothrombin synthesis.

H. Lehmann

Merskey, C. **Survival of Transfused Red Cells in Scurvy.** *Brit. Med. J.* 1953, Dec. 19, 1353–6, 2 figs. [11 refs.]

Eight patients with scurvy and anaemia, 7 Bantu and 1 Indian, were investigated at the Groote Schuur Hospital in Capetown. All presented the classical picture of scurvy and had been on a diet consisting solely of maize

and white bread. There was no other condition than vitamin C deficiency to account for the anaemia. The survival time of transfused red cells was determined by the Ashby agglutination technique before and after vitamin C therapy. In 3 it was normal, in 5 greatly decreased before but normal after vitamin C therapy. In addition a 9th scurvy patient who was not anaemic also showed a shorter survival time of transfused red cells before he was given vitamin C. The phenomenon of excessive rate of disappearance of donor cells may be due either to haemorrhage (haematoma formation, bleeding gums, etc.) or to haemolysis. The author is not dogmatic in his interpretation but inclines to the view that the real cause of the anaemia of scurvy is haemolysis. *H. Lehmann*

Pratt, P. T. & Johnson, M. E. **Marrow Iron Stores in Anemia.** *Arch. Intern. Med.* 1954, May, v. 93, No. 5, 725–30.

To study the reciprocal relationship between circulating haemoglobin and iron stores, 116 bone-marrow smears were stained for haemosiderin, and the amount of haemosiderin seen was graded from 0 to 4. The patients were placed in several categories: no anaemia or normocytic anaemia (leukaemia 19, congenital haemolytic anaemia 3, acquired haemolytic anaemia 2, acute bleeding 4, miscellaneous infections (nephritis, carcinoma, etc.) 49, microcytic anaemia 13, macrocytic anaemia 11, polycythaemia 4, and pregnancy 11.

The iron stores were reduced in patients with chronic bleeding and in nutritional anaemias of infancy; in pregnancy they were lower the more pronounced the anaemia and they were high in macrocytic anaemias and in normocytic anaemias not due to acute bleeding. *H. Lehmann*

Edington, G. M. **Haemosiderosis and Anaemia in the Gold Coast African.** *West African Med. J.* 1954, June, v. 3 (n.s.), No. 2, 66–70. [13 refs.]

In South Africa [this *Bulletin*, 1952, v. 49, 1166; 1951, v. 48, 63] a high percentage of haemosiderosis is found in the livers of adult Africans, but this is not the case of Uganda (Davies and Trowell, *British Medical Journal*, 1951, v. i, 1514). The present paper reports that haemosiderosis demonstrated histochemically was found in 82 of 251 livers examined in the Gold Coast. It could be present in new-born babies as well as in infants and adults but only in adults were cases seen in which the haemosiderosis was severe. It was noteworthy that the livers of 5 children suffering from kwashiorkor and 10 from malaria did not contain iron pigment. In addition the livers of 3 grossly malnourished males and 2 females suffering from beriberi and pellagra respectively were also free from the pigment. The author concludes that haemosiderosis is apparently a common occurrence in the Gold Coast African and is not linked specifically with any condition. He correlates the haemosiderosis found in the West African with the fact that hypochromic anaemia is rare although there are many infections which commonly cause hypochromic anaemia in other parts of the world.

H. Lehmann

Currin, J. F. **Occurrence of Secondary Hemochromatosis in Patient with Thalassemia Major.** *Arch. Intern. Med.* 1954, May, v. 93, No. 5, 781–6, 2 figs. [21 refs.]

So few patients with thalassaemia major live to adult life that the complication of increased iron deposition in the liver and other organs due to defective utilization of the metal for haemoglobin production has not

received much attention. A 25-year-old Italian woman is described who had been diagnosed as a case of thalassaemia major 21 years ago. A splenectomy was performed then and blood transfusions were given at infrequent intervals during the next 11 years. She then received within one year 4 transfusions of 500 ml. of blood each. Six years later a cholecystectomy had to be performed and calcium bilirubinate stones were removed from the gall bladder and the common duct. She received 6 transfusions while she was in hospital. After 5 months she became severely ill with homologous serum jaundice; she recovered; no transfusions were given on that occasion. Three years later she was seen again with a swollen abdomen and a liver palpable 4 fingerbreadths below the costal margin. A liver biopsy was performed and 2 photomicrographs are reproduced. One stained with haematoxylin and eosin shows extensive fibrosis, one stained for iron demonstrates haemosiderosis.

The author suggests that the excessive iron deposition is the result of the red cell destruction found in a thalassaemia major patient surviving for a longer time than usually seen. He does not think that the transfusions caused the haematochromatosis in this particular instance, but rather that the blood transfusions prolonged the patient's life and thus allowed the haemochromatosis to become apparent. "In recent years big strides have been made in transfusion therapy for thalassemia. It is likely, therefore, that increasing numbers of patients with the severe form of this disease will survive to adult life. They will be increasingly prone to develop hemochromatosis, both from transfusions and from the basic altered metabolism of their disease." *H. Lehmann*

Silvestroni, E. & Bianco, I. Un problema medico-sociale: la microcitemia e il morbo di Cooley. [**A Medico-Social Problem: Microcythaemia and Cooley's Anaemia**] *Ann. d. San. Pubblica.* Rome. 1953, Nov.–Dec., v. 14, No. 6, 1439–69, 17 figs. [Numerous refs.] English summary.

Cooley's anaemia has been described in the U.S.A., usually in the offspring of Mediterranean (Greek and Italian) emigrants, and is associated with splenomegaly, a mongoloid face, and changes in the bones particularly of the hands and face. The authors of this paper discovered a familial type of microcythaemia about 1942–43 when they were investigating cancer cases and searching for a diagnostic reaction specific to carcinoma. Their cases of microcythaemia "carriers" are characterized by a reduced fragility of the red blood corpuscles, hypochromia and some increase in the number of red cells which show changes in shape as well as reduction in size. The subjects are usually healthy and some show a characteristic facies with prominent cheek-bones and a nose which is sunk at the root, hollow along the bridge and thick at its tip; they have pale skins and mucous membranes and complain of lack of energy.

Distinct from the above is the less common, pathological condition which is here referred to as "constitutional microcytic anemia" and which is of a haemolytic type with enlargement of spleen and liver, shows marked morphological changes in the red cells, follows a chronic course and resists treatment.

The subjects of Cooley's disease suffer from severe anaemia, enlargement of the spleen and liver and changes in the skeleton. They develop a mongoloid expression and their disease proves fatal within about one year. A more rapid form of the disease occurs at the age of 2–3 months, which was at one time confused with von Jaksch's anaemia and proves fatal before the

first birthday and before the facial and other skeletal changes have had time to develop. Cooley's anaemia is of the hypochromic variety, the blood showing microcytosis, aniso-poikilocytosis, erythroblastosis and an increased resistance of the corpuscles.

After investigating the families of 380 cases of Cooley's anaemia, the authors state that the disease only occurs when both parents have microcythaemia. Microcythaemia, on the other hand, is a " semi-dominant " Mendelian character which an offspring inherits from either of his parents. Constitutional microcytic anaemia occurs in the offspring of a parent who has microcythaemia and the subjects of this pathological condition may beget children who may be " carriers " of microcythaemia or may be normal.

In studying these conditions the authors have examined about 55,000 subjects in Italy and found the cases to be particularly frequent in certain parts of the country. They have put forward a hypothesis, on the basis of certain historical and statistical connexions which they quote, to the effect that the condition was introduced into Italy, and elsewhere in the Mediterranean and beyond, with Greek immigrations and with the spread of early civilization from Ancient Greece.

The authors discuss the social welfare and other economic aspects of the problem of microcythaemia in Italy and urge that further studies should be undertaken. *J. Cauchi*

Dunlop, K. J. **Sickle Cell Anaemia in Assam.** *Proc. Ann. General Meeting of Assam Branch Brit. Med. Ass., Cinnamara, 12th–15th March, 1953.* 32–6. 1953. Calcutta: Indian Tea Association.

See Dunlop and Mozumder, this *Bulletin*, 1953, v. 50, 645, for an account of the same cases. *H. Lehmann*

Germán Olivier, A. Anemias hemolíticas familiares en la República Dominicana. Contribución al estudio de la drepanocitosis. [**Contribution to the Study of Sicklaemia in the Dominican Republic**] *Rev. Med. Dominicana.* 1953, Apr.–May–June, v. 8, No. 2, 85–120. [12 refs.]

This contribution consists of general remarks on sickle-cell anaemia with an account of the symptoms, records of its prevalence in Africa and the United States and in the Latin American States. Among the 1,000 observations made on patients in hospital and those met with in private practice the author has seen 59 cases (5·9 per cent.). He describes the blood condition, the fever, the articular symptoms, the abdominal crises, the muco-cutaneous, pulmonary, cardio-vascular and nervous manifestations, the diagnosis and treatment, which is purely palliative. He gives full details of 6 patients, 4 males aged 14, 18, 21 and 47 years, and 2 females aged 13 and 30 years, with the results of blood examinations and the various laboratory findings.
H. Harold Scott

Thoma, G. W. **The Incidence and Significance of Sickle Cell Disease in Deaths subject to Medicolegal Investigation.** *Amer. J. Med. Sci.* 1953, Oct., v. 226, No. 4, 412–18. [44 refs.]

Numerous references are quoted which suggest that the old concept of a sharp division between the sickle-cell trait and the anaemia cannot be maintained. The former should no longer be ignored as merely a curiosity without clinical significance. Thus Bauer has proposed the term " sickle cell disease " specifically to include the non-anaemic types as well as those

with active anaemia who die from their thrombotic complications rather than from the anaemia itself (Bauer, *Arch. Surg.*, 1940, v. 41, 1344) and Bauer and Fisher [this *Bulletin*, 1945, v. 42, 484]. The present author reviewed all autopsies performed on Negroes over the last 2 years in the Office of the Chief Medical Examiner of the Commonwealth of Virginia. Traumatic cases in which death had been instantaneous were excluded. Of the remaining 126 eleven were found which showed either a fully developed sickle-cell crisis with or without other serious disease, or merely the presence of sickle cells in the blood vessels. The evidence for crises was: characteristic pooling of blood around the splenic follicles, packing of liver sinusoids and of the glomerular capillaries with massed sickle cells, distension and plugging of vessels and capillaries in all other tissue sections with massed sickle cells. Evidence for past activity was: old vascular thrombi, especially in lungs, spleen or brain, haemosiderin deposits in spleen, liver and bone-marrow, scarred atrophic spleen. Evidence of a merely terminal sicklaemia was the presence of sickle cells in the vessels without the above changes. Of the 11 cases 4 showed a terminal crisis set off by other serious disease such as bronchopneumonia and without evidence of past sickle-cell disease, 4 showed the sickle-cell disease to be the only cause of death or as an important contributing condition with evidence of past activity, 3 were thought to show terminal sickling only. *H. Lehmann*

Vandepitte, J., Claessens, H. & Martin, M. Tuberculose et *sicklémie* (sickle-cell trait). [**Tuberculosis and Sicklaemia**] *Ann. Soc. Belge de Méd. Trop.* 1953, June 30, v. 33, No. 3, 259–67. [14 refs.]

A number of authors have stated that the sickle-cell trait was found more frequently in tuberculous persons than in non-infected control groups. In the present investigation 250 Africans in Léopoldville who were admitted to hospital for tuberculosis of the lungs were compared with 2 control groups: 812 women attending the post-natal outpatient clinic of the African hospital in Léopoldville and 548 healthy African soldiers stationed at Camp Léopold. The percentage of sicklaemia in these 3 groups was 26·0, 25·0 and 25·0 respectively. Within the tuberculous group those with and without sicklaemia showed no significant difference in haemoglobin level and although there was a difference between the two groups in the mean red cell sedimentation rate, on closer analysis this could not be attributed to the influence of sicklaemia. *H. Lehmann*

Neel, J. V. **Implications of some Recent Developments in Hematological and Serological Genetics.** *Amer. J. Human Genetics.* 1954, June, v. 6, No. 2, 208–23. [Numerous refs.]

VENOMS AND ANTIVENENES

Kuwajima, Y. **Immunological Researches on the Main Formosan Poisonous Snakes, especially on the Venoms. IV. Production of Polyvalent Antivenin and Expiration of Antivenins.** *Japanese J. Exper. Med.* 1953, Aug., v. 23, No. 4, 299–304, 6 figs. on pl. [12 refs.]

" A polyvalent antivenin was produced by the inoculation of the venoms of Naja naja atra and Bungarus multicinctus simultaneously into a horse,

showing 100 a.u. and 220 a.u. to the venoms of Naja naja atra and Bugarus multicinctus respectively.

"This polyvalent antiserum could neutralize the venom which had never been used as antigen in the immunization. The venom of Naja hannah which could not be neutralized by the monovalent anti-Naja naja atra serum could be readily neutralized by the above polyvalent antiserum. The polyvalent antiserum showed that it may be regarded as a drug for the bites of Naja snakes in Far-Eastern Tropical Asia.

"The titre of anti-Naja naja atra serum can be maintained for 3 years without any loss of its original value, but that of Trimeresurus mucrosquamatus was reduced to one half of the original after one-year keeping at 2°C. In this way, the expiration of the antivenin is different from each other according to the kind of antivenin."

Fischer, F. G. & Dörfel, H. Adenosin im Gift der Puffotter *Bitis arietans* (Schlangengifte I). [**Adenosine in the Venom of the Puff Adder,** *Bitis arietans*] *Hoppe-Seyler's Ztschr. physiol. Chem.* 1954, v. 296, Nos. 5/6, 232–8. [Refs. in footnotes.]

The authors' summary is translated as follows:—

The venom of the puff adder (*Bitis arietans*) contains up to 12 per cent. of adenosine. This nucleoside was identified and determined by partition paper chromatography and isolated after ultrafiltration from a solution of the venom.

Adenosine was excreted as such from the poison glands of the puff adder and did not originate in the secretion secondarily from either adenosine phosphoric acid or ribonucleic acid.

In the study of the venoms of some other Viperides and Colubrides, that of *Dendraspis viridis* alone was found to contain adenosine (2·6 per cent.).

H. J. O'D. Burke-Gaffney

Millard, P. T. **Whiplash Dermatitis produced by the Common Rove Beetle.** *Med. J. Australia.* 1954, May 15, v. 1, No. 20, 741–4, 5 figs.

There is a Spanish word *fuetazo* meaning whiplash, and in Ecuador the *fuetazo* beetle is known to produce lesions known as *fuetazo* or whiplash dermatitis.

The present article describes a similar dermatitis produced in Australia by the *Paederus cruenticollis* or rove beetle—an ant-like creature about half an inch long with an orange neck and a habit of running about with the tail cocked up. The lesion produced consists of a weal, purplish red in colour, later covered with a crop of fine vesicles and surrounded by a further half inch of erythema. It heals in about a week. The toxic principle is unknown, but the delayed reaction suggests that it is not cantharidin.

Rove beetles are known in every continent, causing Nairobi eye in Africa, dermatitis in the Volga basin, and *fuetazo* dermatitis in Ecuador.

Blisters result from crushing the beetle and smearing it over the skin, particularly when the latter is moist or degreased. No harm results when the live beetle crawls over the skin surface. Contact lesions can occur where two skin surfaces touch, and the vesicle fluid is probably itself vesicant.

Insects should not be swatted or squashed on the skin. Where this has already been done the area should be washed immediately with soap and

water and possibly degreased with petrol or ether. When blistering has occurred Butesin picrate is recommended as a local application, with alkaline irrigations for the eyes if they have been affected.

H. T. H. Wilson

TOXOPLASMOSIS

Faure, Pierre. La toxoplasmose humaine. Épidémiologie: Enquête sérologique. [**Human Toxoplasmosis. Epidemiology: Serological Survey**] 156 pp., 3 figs. on 2 pls. 1953. Lyons: Bosc Frères, 42, quai Gailleton.

This is a second thesis on toxoplasmosis for the doctorate of medicine in the University of Lyons appearing in 1953. In the first one, Garin [this *Bulletin*, 1954, v. 51, 219] dealt mainly with clinical data on acquired human toxoplasmosis, while the serological survey was carried out by the present author, who describes its results in this thesis.

In the first part of the paper a critical review is given of the aetiology, diagnostic methods and epidemiology of toxoplasmosis, covering the same ground as the corresponding part of his colleague's thesis [*cf. loc. cit.*].

The second part comprises the author's original observations on the incidence of toxoplasmosis in various groups of the population of Lyons and the vicinity, with the use of an improved complement-fixation test. In a control group of sera obtained from 105 blood donors of Lyons, Oyonnax, Villefranche and Bellegarde the reaction was positive in 9 (8·5 per cent.). Among 56 adult patients of the neurological and psychiatric wards the proportion reacting positively was similar (8·9 per cent.). In a group of 163 children between 5 and 18 years old, comprising cases of epilepsy and various degrees of mental impairment, positive results were obtained in 33 (20 per cent.). Sera obtained from women shortly after confinement were positive in 28 (25 per cent.) out of 116 cases. These included 32 healthy women with normal offspring, 64 who gave birth to infants weighing less than 2,500 gm., and 7 with still-births. Tests were also made with sera obtained from hospital patients suffering from various diseases. The reactions were positive in the following cases: one with thrush, one with uveitis, some with chorioretinitis, 4 out of 9 with pulmonary tuberculosis, 4 out of 9 with leptospirosis, and 2 out of 5 with typhoid.

A long list of references concludes the thesis: unfortunately the bibliography is carelessly compiled, and abounds in misprints [*e.g.*, a paper by the well-known French parasitologist, Coutelen, appears under this name, and further under "Cutelin", while in the text he is referred to as "Coutelin"].

C. A. Hoare

Proc. Roy. Soc. Med. 1954, June, v. 47, No. 6, 481–8 (Sect. Ophthalmology 9–16), 10 figs. [26 refs.] **Discussion: Toxoplasmosis** [Pulvertaft, R. J. V.; Smith, C. H.; Hudson, J. R.; Morgan, G.; Cathie, I. A. B.].

The Institute of Ophthalmology in London has for some time been interested in toxoplasmosis and the two main papers are from Dr. Smith, concerning the histological and pathological aspects, and from Mr. Hudson, concerning the clinical aspects of toxoplasmosis.

From the histological point of view, Smith remarks that there may be

both congenital and acquired forms. The congenital infection may manifest itself as an acute encephalitis with fatal consequences, or have remote sequelae such as hydrocephalus and chorio-retinitis. In an adult the disease may be fulminating and simulate typhus fever, or less acute and present as a case of glandular fever, or chorioretinitis. Finally, if his laboratory studies are correct, a large number of persons must be infected without any apparent pathological lesion being produced.

The author remarks that histologically there is little specific in most of the lesions unless toxoplasma bodies can be demonstrated. Woods, in retrospect, diagnosed many of their cases of granulomatous uveitis as of toxoplasmic origin, but Smith is critical of this attitude; firstly because of the use of the term "granulomatous" and secondly because the introduction of non-living foreign materials into the eye can induce a similar granulomatous type of reaction. He goes on to say that there are 3 main grounds on which the diagnosis of acquired chorioretinal lesions may be regarded as of toxoplasmic nature: (1) demonstration of the parasites which may have to be differentiated from certain other phenomena; (2) experimental lesions—Smith reviews the literature and concludes that the lesions are initially retinal with secondary choroidal involvement; (3) serological studies—it has been conclusively shown that there is a relationship between toxoplasmosis and chorioretinitis in children, but it is only recently that reports of a similar correlation have been published concerning the acquired chorioretinitis. In Smith's own series over 100 cases of active anterior uveitis have been shown to have the same toxoplasma antibodies as would be present in healthy persons of similar age groups, again suggesting that the toxoplasmic lesions are posterior in origin. An interesting point is that there may be a correlation between toxoplasmic antibodies and the Middlebrook-Dubos Test. The parasite has not so far been recovered from the aqueous humour which is again in keeping with the posterior location of the disease.

Smith summarizes by saying that in their experience toxoplasmic chorioretinitis is a definite entity, but its histology is not sufficiently characteristic to enable them to diagnose the condition without the demonstration of the parasite in the lesion. Furthermore, considerable care must be exercised before asserting that any particular body appearing in a section is truly a toxoplasma. In fact it is probably impossible to make a diagnosis of toxoplasmosis on any single feature either clinical, histological or serological. While serological studies may help them to decide if a case is one of toxoplasmosis, Smith believes that a single observation of a titre can seldom be considered diagnostic, and the problem of serological diagnosis is similar to that of influenza or other widespread infections in which a changing titre is the only acceptable serological test.

Mr. Hudson's review of the clinical aspects of toxoplasmosis excluded the acute systemic disease in infants as cases of this type are most unlikely to be seen at an Eye Hospital. He classifies the clinical findings into ocular manifestations, signs secondary to encephalomyelitis and general signs. He discusses the common presenting features in patients who have had a toxoplasma infection and the confirmatory findings, with particular reference to the titres regarded as significant in the various age groups. A number of adult case histories with the results of investigations are given.

He concludes by saying that the toxoplasmosis should only be diagnosed when the laboratory investigations and clinical evidence all point in the same direction. He is unwilling to make the diagnosis, especially in the younger age groups, unless the clinical findings on ophthalmological and X-ray examination are supported by significant serological titres.

Some interesting remarks were made in the subsequent discussion and anybody with a particular interest in this subject should read the report of the meeting as a whole. *D. P. Choyce*

Gerard, P. A propos d'un cas de toxoplasmose. [**A Case of Toxoplasmosis in Belgium**] *Gaz. Méd. Portuguesa.* 1954, v. 7, No. 1, 113–15.

The English summary appended to the paper is as follows:—

"The author makes a brief description of a new case of toxoplasmosis in Belgium. He puts forward the hypothesis of a possible transplacental transmission of this affection to successive children of a mother with unapparent toxoplasmosis."

Paul, J. Latente konnatale Toxoplasmose. [**Latent Congenital Toxoplasmosis**] *Klin. Woch.* 1954, June 1, v. 32, Nos. 21/22, 485–91. [14 refs.]

It is known that toxoplasmic infection can be acquired by adults without giving rise either to symptoms or signs. The work here described provides some evidence that a congenital infection of infants can also remain latent. Sera from 428 sucklings and infants not suspected of having toxoplasmosis were tested by the Sabin-Feldman test. In the series there were 223 infants under 1 year, 104 children between 1 and 2 years old and 101 children in the 3rd year of life. It was found that in the first 6 months of life a positive test (1 in 4 or higher titre) was obtained in about 30 per cent. of cases but that after this age positive tests were extremely rare. The positives are regarded as being the result of passive transmission of antibodies *in utero* since examinations of the sera of the mothers of those sucklings who gave these positive results were also positive.

Among the positives were 5 which gave very high titres:—(1) a suckling aged 2 months (titre 1 in 256) suffering from *Bact. coli* Type O111/B4 infection, (2) a child aged 14 months (titre 1 in 64) with vaccinal encephalitis, (3) a child aged 18 months (titre 1 in 64) suffering from pertussis encephalitis, and (4) and (5) children in the third year of life who were cases of tuberculous meningitis—the sera gave high titres of up to 1 in 1024. None of these patients had any of the typical signs or symptoms of congenital toxoplasmosis but all are regarded as being latent infections because the mothers' sera gave positive results, the titres were high, the titres when examined later remained high, and for other reasons which are fully discussed. In the patient with tuberculous meningitis (No. 4) the cerebrospinal fluid was examined at 2½ years of age when toxoplasms were seen on direct microscopical examination and confirmed by animal inoculation.

M. E. Delafield

Holz, J. & Bringmann, G. Vergleichende elektronenmikroskopische Untersuchungen an Toxoplasmen und Sarcosporidien. [**Comparative Electron-Microscopic Observations on Toxoplasms and Sarcosporidia**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 139, No. 3, 239–42, 4 figs.

In view of the occurrence of both sarcosporidia and toxoplasms in the same tissues of infected hosts and because of the similarity in their appearance [?], the authors stress the importance of a differential diagnosis of these parasites. For this purpose, a comparison was made of their structure as seen with the electron microscope. The preparations of the parasites [presumably free toxoplasms and sarcosporidial spores] were made by the method described previously [this *Bulletin*, 1954, v. 51, 217]. After

repeated washing in distilled water, the material was kept for 2 hours in double-distilled water at 60°C. When examined with the electron microscope, the toxoplasms were transparent, showing the nucleus and phosphate inclusions, whereas the sarcosporidia appeared as dark opaque masses showing no inner structure.

The appearance of the 2 organisms is depicted in a plate. It is concluded that the differences revealed by electron microscopy speak against a close affinity between these two parasites. [The reviewer can only repeat the comment made in the previous abstract (*loc. cit.*).] *C. A. Hoare*

Schmidtke, L. Zur oralen Übertragbarkeit der Toxoplasmose. [**On Oral Transmissibility of Toxoplasmosis**] *Zent. f. Bakt.* I. Abt. Orig. 1954, Feb. 15, v. 160, No. 6, 470–78.

Though a number of workers claim to have succeeded in the experimental transmission of toxoplasmosis by the mouth, the author's attempts to infect mice by feeding them on teased-up crops and guts of infected flies produced negative results.

In the present paper he describes experiments designed to throw light on this question, by studying the behaviour of *Toxoplasma in vivo* and *in vitro*, within the gastro-intestinal tract and when exposed to digestive juices.

For this purpose, the peritoneal exudate of infected mice was used after concentration by centrifugation for 20 minutes at 1,500 r.p.m., and the results of the experiments were checked by intraperitoneal inoculation of clean mice.

The results were as follows. When the concentrate was given to mice as food, the parasites died in their stomachs after 30 minutes. Parasites placed in human saliva (*p*H 6·7 and 7·3) remained infective for 2 hours, but were dead after 4 hours. In gastric juice of man and laboratory rodents the parasites died after 20 minutes at *p*H 3·1–1·1, after 30 minutes at *p*H 3·2–3·6, and after 2½ hours at *p*H 3·7 and upwards, while in intestinal juice of rabbits and guineapigs (*p*H 6·6–6·7) the parasites were still infective after 1½ hours but died after 3 hours. When exposed to a mixture of subacid gastric (*p*H 7·5) and intestinal juices (*p*H 6·7) for 1½ hours the parasites died, but survived after the same period of time in each of these fluids alone. All the *in vitro* experiments were carried out at 37°C.

From these experiments it is concluded that toxoplasms introduced into experimental animals or human beings *per os* do not survive in their alimentary tract. Hence it is thought that the reported occurrence of these parasites, in the excreta (faeces and urine) of mammals is due to direct invasion of the rectum and urinary bladder from the surrounding tissues in cases of a generalized infection. *C. A. Hoare*

Schmidt-Hoensdorf, F. & Holz, J. Über die Toxoplasmose der weissen Ratte. [**Toxoplasmosis in White Rats**] *Ztschr. f. Hyg. u. Infektionskr.* 1954, v. 139, No. 4, 338–40, 2 figs.

The chronic course of toxoplasmosis in rats poses 2 questions: the rôle of these animals as possible reservoir hosts of human infection, and their use in the experimental study of the disease. The present paper describes experiments on congenital transmission of toxoplasmosis and on the course of the infection in white rats.

When an infected male rat was paired with a normal female, the latter did not become infected and produced a healthy litter. In another experiment, female rats were infected by the intraperitoneal route with

Toxoplasma, and then paired with an infected male. One of these rats aborted after a fortnight, the offspring of two were either stillborn or died shortly after birth, while the young of 2 others were apparently normal up to the age of 6 months. After this the young rats began to manifest various locomotor disturbances. When one of them died 4 weeks after the appearance of symptoms, no macroscopic changes could be seen but toxoplasms were found in the brain.

It has also been demonstrated that toxoplasmosis in rats may run a symptomless course with parasitaemia appearing 48 hours after inoculation. Since rats are commonly infested with fleas which rapidly transfer their attentions to man, the authors believe that the rat is more likely to be a reservoir host of human toxoplasmosis than the dog, which is thought to be the main source of infection in man. *C. A. Hoare*

Treviño, A., Varela, G. & Palencia, L. Terapéutica de la toxoplasmosis experimental del ratón blanco con hidroxicloroquina (Win 1258–2), 5-p-clorofenil-2, 4-diamino-6-etil pirimidina (Pirimetamina o Daraprim) y Fumagilina (Fumidil). [**Treatment of Experimental Toxoplasmosis in White Mice by Hydroxychloroquine, Pyrimethamine and Fumagillin**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 339–41.

The English summary appended to the paper is as follows:—

"Daraprim seems to have therapeutic action against a strain of *Toxoplasma gondii* isolated in Mexico. The observations recorded from the acute experimental toxoplasmosis in mice confirm the results of Eyles and Coleman (1952) [this *Bulletin*, 1953, v. 50, 158] obtained with a strain isolated from the U.S.A.

"Win-1258-2 and Fumidil do not have therapeutic action in the acute experimental toxoplasmosis in mice."

DERMATOLOGY AND FUNGUS DISEASES

Valnet, J. La bourbouille et son traitement. [**Prickly Heat and Its Treatment**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1080–90. [12 refs.]

The synonyms for prickly heat include lichen tropicus, tropical eczema, miliaria rubra, sudamina, miliarasis erythematosa et papulosa tropica, and, among the French, *la bourbouille*, *gale bédouine* and *impétigo miliare*. It may be defined as a dermatosis peculiar to tropical countries, consisting of an extremely pruritic eruption with miliary vesicles and diffuse erythema.

The sites affected are classically the neck, chest, abdomen and parts beneath the waistband, braces and collar, palms, soles and axillae being normally spared. A distribution differing from the classical one was commonly seen by the author in the Far East. There the folds were especially attacked, the sites of election being the elbows, axillae, folds at the front of the neck, forearms and chest. It was common on the forehead and the back, particularly round the shoulder blades. Elsewhere it was rarely seen.

There are 3 stages in the development of prickly heat. First a diffuse erythema with discrete papules and a sensation of pricking, particularly in the folds and on the chest. Periodical exacerbations give the sensation of

multiple pin-pricks. The second stage consists in the development of vesicles the size of a pin's head or larger, particularly over the shoulders and sides of the chest. From these a translucent or whitish fluid may be expressed leaving a crater less painful than the original vesicle. Thirdly, secondary infection leads to the formation of purulent vesicles and necessitates hospitalization. Constant itching results in insomnia, neurosis, and finally the state of tropical anhidrotic asthenia described by Allen and O'Brien [this *Bulletin*, 1945, v. 42, 313; 1951, v. 48, 925].

The author discusses the various theories regarding the causation of prickly heat. These include fungus infection, alteration in the *p*H of the sweat and, more recently, sweat retention.

The diversity of accepted forms of treatment testifies to the absence at present of any specific nostrum for this complaint. The ideal topical application should have the following qualities:—

(1) the ability to remove the horny plugs which block the vesicles and prevent the flow of sweat; (2) the power to restore to the skin its normal acidity, to prevent maceration and secondary infection; (3) it should, if possible, carry an electro-positive charge. The following formula was devised by the author:— acid benzoic 0·1 gm.; acid salicylic 0·2 gm.; acid acetic 0·3 gm.; acid tartaric 0·7 gm.; excipient to 100 cc. and of *p*H 2·5. The results of treatment with this application have been, in the author's experience, uniformly good. *H. T. H. Wilson*

See also p. 1099, Millard, **Whiplash Dermatitis produced by the Common Rove Beetle.**

Negroni, P. Estudios sobre el *Coccidioides immitis* Rixford et Gilchrist. IX. Ciclo evolutivo. [**Studies on *Coccidioides immitis* Rixford and Gilchrist. IX. Evolutionary Cycle**] *Rev. Inst. Malbrán.* Buenos Aires. 1950–53, v. 15, No. 1, 18–24, 4 figs. English summary.

The author has observed a two-phase parasitic life cycle of *Coccidioides immitis* in the guineapig, similar to that described by Posadas in his original study of *Coccidioides*. The stages of this cycle offer a convenient means of measuring the velocity of development of the parasite in the guineapig. These stages are: (1) the young parasitic spherule developing directly from the infecting saprophytic " entospore " and often showing a persisting tag of the original mycelial cell wall; (2) a larger, thin-walled spherule with a differentiated peripheral zone of fertile protoplasm; (3) the thin-walled " infection sporangium " in which the fertile peripheral protoplasm is divided by cleavage planes into a number of irregularly shaped, multinucleate masses or protospores surrounding a central lacuna; (4) the thin-walled " intermediate sporangium " in which the subdivision of the protospores gives rise to polyhedral or irregularly shaped " amoeboid " spores which fill the sporangium and obliterate the lacuna. This sporangium is provided with an ostiole through which amoeboid spores escape and develop into stage 2 (above), thus completing the infective cycle, or the sporangium may give rise to (5), the young parasite cyst with a thick cell wall of radial structure, which in turn develops into (6), the large fertile sporangium filled with round or oval endospores, and having a thick cell wall covered with oxyphile, spinous processes; this sporangium opens by dehiscence (7) and discharges its endospores, which also have oxyphile processes on their surface; the endospores, on liberation, may develop into stage 5 and complete a short cycle, or into stage 4 and repeat the long cycle.

Two guineapigs were inoculated intratesticularly with living culture

material of *C. immitis* containing entospores. One of the animals was killed after 3 days and the other after 9 days and observations were made of the pathological changes and the parasitic stages of the fungus present, for comparison with the experimental results described below. Two series of 8 guineapigs were then inoculated intramuscularly with the culture material, and at intervals, from the time of inoculation, of 2, 4, 6, 9, 12, 15, 18 and 21 days, one animal of each group was inoculated with the culture material intratesticularly. The guineapigs of one series were killed 3 days after the intratesticular inoculation and those of the other group 9 days after it. The testes and other tissues of all the animals were examined histologically and mycologically to determine what, if any, degree of resistance to reinfection (intratesticular) had been provoked by the initial infection (intramuscular).

There were indications of some degree of acquired resistance in the slower evolution of the parasite, the smaller size of the sporangia, a polymorphism resulting from a disturbance of the even advance of the developmental cycle, in which various stages were present together, and other fungistatic effects. Histological changes of resistance, particularly the appearance of multinucleate phagocytic cells, were better marked with the increasing interval between the initial and the second inoculations. *J. T. Duncan*

Lubarsky, R. & Plunkett, O. A. **Survival of *C. immitis* in Passage through the Digestive Tract of Mice.** *Pub. Health Rep.* Wash. 1954, May, v. 69, No. 5, 494–7, 1 fig.

To investigate the possibility of small rodents acting as carriers or disseminators of *Coccidioides immitis*, the authors conducted feeding experiments with the fungus on laboratory white mice and on the deer mouse (*Peromyscus* sp.), an animal naturally susceptible to coccidioidomycosis.

In one series of experiments, white mice were fed with drinking water containing arthrospores and mycelia from cultures of the fungus. The contaminated drinking water was supplied over a period of 3 hours, and 24 and 36 hours later samples of the animals' faeces were collected and examined by culture for the fungus. This experiment was repeated 3 times within a week, a one-day interval being allowed between the tests. The results showed that *C. immitis* was present in the faeces at the end of 24 hours but not at the end of 36 hours, and none of the animals became infected.

In another series of tests, the feeding suspension of culture material was replaced by a suspension of the parasitic spherules of the fungus, freshly collected from the peritoneum and tissues of artificially infected mice. The feeding was done at 2-day intervals and samples of the faeces were taken every 24 hours. After 2 experimental feedings with the spherules, a return was made to feeding with the arthrospore suspension with the same group of mice and at the same intervals up to the end of 2 weeks. The results showed that although *C. immitis* could be isolated from the faeces of all the animals after the spherule feeds and from nearly all after the arthrospore feeds, no animal showed any sign of infection.

A final series of tests was made individually on 16 mice—12 laboratory white mice and 4 deer mice—each housed in a separate glass " cage ". The animals were denied drinking water for 24 hours and then each was allowed to drink water containing a heavy suspension of arthrospores, during a period of 3 hours. Twelve hours later, a specimen of faeces was expressed from each mouse and this method of sampling was repeated after 12 hours when a composite sample of the droppings in the cage was also collected. The cages were then cleaned and sterilized and the experiment was repeated. Thereafter, feedings were made with the macerated tissues of infected mice.

The results of these tests showed that *C. immitis* was present in the faeces of all the animals at the times of examination.

The authors conclude that " there is a possibility that *C. immitis* may be disseminated in soils by fecal droppings of predatory animals who have fed on infected rodents ". *J. T. Duncan*

González Ochoa, A., Hernández P., Elena & Colorado Iris, R. Experimentación terapéutica con vainillato de etilo en dos casos de coccidioidomicosis y uno de micetoma actinomicósico por *Nocardia brasiliensis*. [**Experimental Trial of Ethyl Vanillate in Two Cases of Coccidioidomycosis and one of** *Nocardia brasiliensis* **Infection**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 265–77, 3 charts.

The English summary appended to the paper is as follows :—

" This paper deals with the experimental use of ethyl vanillate in two human cases of coccidioidomycosis and one of actinomycotic mycetoma by *Nocardia brasiliensis*. The fungi isolated from patients were inhibited ' in vitro ' by the drug in concentrations of 12·5 mgm. % for both strains of *Coccidioides immitis* and of 50 mgm. % for *Nocardia brasiliensis*. The drug was administered for 40 days without any positive result. In the three cases it was not possible to attain continually the same blood concentration that was needed for the ' in vitro ' inhibition. Even very large doses, as high as 50 to 60 gm. daily, for 24 days, were not followed by constant therapeutic levels, drops to 5 mgm. and increases to 38·9 having been observed."

González Ochoa, A. & Rosiles, H. Probable curación de un caso de granuloma coccidioidomicosico por la hidroxicloroquina. [**Apparent Cure of Coccidioidal Granuloma by Hydroxychloroquine**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 261–3.

The English summary appended to the paper is as follows :—

" A case of coccidioidomycosis, which was apparently cured with hydroxichloroquine (Win 1258–2) is reported. The patient had been treated before with ethyl vanillate, with very little improvement; a month after such treatment the fungus was found in the material from the ulcers and the cultures were positive. Hydroxichloroquine was then given at the dose of two 250 mgms. tablets daily; 40 days later the ulcers were completely healed. No toxic trouble followed such treatment which was continued up to 60 days."

Sampaio, S. A. P. & de Almeida, F. O vanilato de etila no tratamento de algumas micoses. [**Ethyl Vanillate in the Treatment of Certain Mycoses**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1953, Dec., v. 18, No. 58, 295–6.

The English summary appended to the paper is as follows :—

" Ethyl vanillate was given for three cases of South American Blastomycosis, one of Chromomycosis and one of Sporotrichosis. It was given 30 to 40 Gm. per day and the course of treatment varied in length from 12 to 21 days. It was not noted any improvement. The minimal inhibiting concentration of the Ethyl vanillate for *Paracoccidioides brasiliensis* was found to be 40 mg per cent."

TROPICAL OPHTHALMOLOGY

Carneiro, Nicola J. Inquérito epidemiológico do tracoma em Guaraçaí, Estado de São Paulo. [**Epidemiological Survey of the Incidence of Trachoma in Guaraçai, São Paulo, Brazil**] *Arquivos de Hig. e Saúde Pública.* S. Paulo. 1954, Mar., v. 19, No. 59, 7–10. English summary.

The author made a survey of 463 schoolchildren in the municipality of Guaraçai, São Paulo, Brazil. Of these 256 were males and 207 females, 286 were from urban and 177 from rural areas. Altogether, 70 cases (15·1 per cent.) of trachoma were found, 48 in girls (23·2 per cent.) and 22 in boys (8·2 per cent.). There was a very slight preponderance in rural areas.

The author points out the need for trachoma dispensaries in areas where it is greatest: they should include a mobile unit.

H. J. O'D. Burke-Gaffney

See also p. 1100, Proc. Roy. Soc. Med. 1954, June, v. 47, No. 6, 481–8. **Discussion: Toxoplasmosis** [Pulvertaft; Smith; Hudson; Morgan; Cathie].

MISCELLANEOUS DISEASES

Le Gac, P., Sicé, A. & Viollier, G. Contribution aux déterminations par électrophorèse des protéines du sérum sanguin de noirs de l'Oubangui (sujets sains et sujets malades). [**Determination by Electrophoresis of the Proteins of Blood Serum of Africans from Oubangui in Health and Disease**] *Bull. Soc. Path. Exot.* 1954, v. 47, No. 1, 108–12.

The serum protein fractions obtained by electrophoresis have been determined in a limited number of cases of healthy and sick Africans. The normal subjects showed a lower albumin value, higher α_1- and α_2-globulins, lower β-globulin and excess of γ-globulin compared with Europeans. The H-component was observed between the β- and γ-globulin on the electrophoretic curves.

In leprosy the hypoglobulinaemia was accentuated and the γ-globulins and total globulin were increased. The H-component represented about 10 per cent. of the total serum proteins. In yaws (4 cases) the divergences from normal were less marked. *J. H. Birkinshaw*

Chari, V. K. **An Unusual Case of Tropical Eosinophilia.** *J. Indian Med Ass.* 1954, June, v. 23, No. 9, 408–9.

"This case is reported on account of a continuous type of temperature which is an unusual manifestation of tropical eosinophilia."

Jaffe, E. & Perlmutter, I. **Tick Paralysis (successfully treated in the Stage of Ataxia).** Report of a Case. *J. Pediatrics.* St. Louis. 1954, July, v. 45, No. 1, 98–100. [16 refs.]

"1. This is believed to be the first reported case in the state of Florida. It is interesting to note that this case occurred during the month of

November. Although summer is the time when ticks are found in temperate zones, in south Florida the year-round subtropical climate predisposes to the continuous presence of these insects. Tick paralysis may occur throughout the year in this area.

" 2. This patient was first suspected of having ' polio '. It is hoped that this case report will focus a little more attention on the existence of tick paralysis—a curable paralysis of childhood."

PARASITOLOGY: GENERAL

Menolasino, N. J. & Hartman, E. **Immunology and Serology of some Parasitic Protozoan Flagellates. II. The Hemoflagellate Protozoa, *Leishmania donovani* and *Trypanosoma cruzi*.** *J. Protozoology.* Utica. 1954, May, v. 1, No. 2, 111–13.

Rabbits were immunized to *Trypanosoma cruzi* and *Leishmania donovani* respectively, by 3 intravenous inoculations at 3-day intervals with parasite material prepared as follows. Cultures were made on a diphasic medium (blood agar and Locke's fluid) at room temperature in 10 per cent. carbon dioxide. After 10–12 days, the culture was harvested, and 2 types of antigen were prepared, (1) insoluble cell material and (2) cell-free lysate. Immunized rabbits were bled on the 12th, 13th and 14th days, serum was stored at −20°C. and inactivated before use. Serial dilutions were tested with living cultured organisms adjusted to standard densities with a McFarland nephelometer, and wet mounts were examined for agglutination (by means of dark ground illumination) after 1, 10, 20, 30, 60, 90 and 120 minutes, and after 18 hours. Two types of agglutination (up to 1 in 10,240) were observed—" somatic " agglutination with or without loss of motility and structure, and agglutination of the posterior ends. There was slight cross-agglutination between the 2 flagellates in regard to the somatic type, but none in regard to the " posterior end " type: these reactions were confirmed after absorption of immune sera with the respective antigens.

P. C. C. Garnham

Weisse, Karla & Wedler, Elisabeth. Über das Vorkommen der sogenannten " Pneumocystis carinii ". [**Occurrence of** *Pneumocystis carinii*] *Klin. Woch.* 1954, Mar. 15, v. 32, Nos. 11/12, 270–71. [17 refs.]

The recent findings, in the lungs of infants suffering from interstitial pneumonia, of the protist, *Pneumocystis carinii*, which is regarded as the causative organism of this disease [this *Bulletin*, 1952, v. 49, 194, 908; 1953, v. 50, 456, 764, 982; 1954, v. 51, 647], has prompted the authors to search for this parasite in the lungs of hospital patients who died from various other complaints. They have examined, in stained smears and sections, the lungs of 152 persons whose ages ranged from 5 days to 79 years. Bodies identical with *Pneumocystis* were found in 23, belonging to different age groups and with diverse symptoms, but none with interstitial pneumonia. From these data it is concluded that if *Pneumocystis* is actually a living organism and not a pathological reaction product, it does not represent a specific parasite but merely a saprophyte, occurring accidentally in persons afflicted by various diseases in a severe form. *C. A. Hoare*

Baló, J. & Schuler, D. Das Vorkommen von *Pneumocystis carinii* in Ungarn und ihre ätiologische Rolle bei der interstitiellen plasmazellulären Pneumonie der Neugeborenen. [**Occurrence of** *Pneumocystis carinii* **in Hungary and its Rôle in Interstitial Pneumonia of New-Born Infants**] *Acta Morphologica.* Budapest. 1954, v. 4, No. 1, 1–7, 6 figs. [13 refs.]

The authors record the finding in Hungary of *Pneumocystis carinii* in the lungs of 5 new-born infants, who were underdeveloped and manifested symptoms of interstitial pneumonia. A detailed account is given of the histopathological changes in these lungs, illustrated by 6 photomicrographs.

C. A. Hoare

ENTOMOLOGY AND INSECTICIDES: GENERAL

[Papers on the toxic effects of insecticides in man are abstracted in the *Bulletin of Hygiene* under the general heading of Occupational Hygiene and Toxicology.]

Lee, D. J. **The Problems of Insect Quarantine.** Reprinted from *Proc. Linnean Soc. of New South Wales.* 1951, v. 76, Pts. 1/2, 15 pp. [18 refs.]

In his presidential address Lee reviews the wide field of medical, veterinary, agricultural and horticultural insect quarantine, particularly of Australia. Modern transport is rapid, and this rapidity increases the chances of insect spread. He thinks insect quarantine measures are justified. The development of insect quarantine legislation in Australia is discussed.

M. C. Williams

Mattingly, P. F. & Adam, J. P. **A New Species of Cave-Dwelling Anopheline from the French Cameroons.** *Ann. Trop. Med. & Parasit.* 1954, Mar., v. 48, No. 1, 55–7, 1 fig.

During recent years 3 species of Anopheline mosquitoes have been described from subterranean grottoes in the Belgian Congo. They are *Anopheles vanhoofi*, *A. rodhaini* and *A. faini*. To these it is now possible to add a fourth species, a unique specimen of which was taken in a subterranean tunnel at Oliga in the French Cameroons. It is here described and named *A. rageaui* and has been deposited in the British Museum. *H. S. Leeson*

Haddow, A. J. **Studies of the Biting-Habits of African Mosquitos.** An Appraisal of Methods employed, with special reference to the Twenty-Four-Hour Catch. *Bull. Entom. Res.* 1954, Mar., v. 45, Pt. 1, 199–242, 11 figs. [46 refs.]

The pioneer work of the author, and his colleagues of the Virus Research Institute, Entebbe, on the systematic catching of mosquitoes over 24-hour periods in plantations, on tree-platforms in forest, etc., in Africa has been extensively abstracted in this *Bulletin* over the past 14 years or so. Although the work was primarily concerned with elucidating the natural history of simian yellow fever in forests of Uganda, a vast amount of data on the biology of many species of mosquitoes has been obtained. This paper

is a critical consideration of the method, the means of analysing the results, and the type of problems in mosquito behaviour which has been revealed. It is not a paper suitable for detailed abstraction; it should be read carefully by those who conduct this type of field work elsewhere or intend doing so.

A narrative of the development of the method since 1940 outlines some of the difficulties which had to be overcome before the present standard of technique was evolved.

The administrative details required to carry out a 24-hour catch—preferably a consecutive series of, say, five 24-hour periods—are discussed at some length. Catching at 3 levels (ground, under-storey, and forest canopy) requires about 20 persons, including a camp-cook and spare baitmen. Each platform and the ground site is occupied by 3 African baitmen working on a rigid rotational schedule. Each man catches for one hour, acts as passive bait for 2, and rests away from the platform for 2 hours at the adjacent camp site.

Mosquitoes alighting on the catcher or the 2 baitmen are taken in glass tubes 15 mm. × 85 mm. which are then plugged with cotton wool. Each hour's collection is kept in a separate bag and, although there are occasions when a shorter time-division is worth while, it should never be more than one hour. Timing of the hours should be related to the actual times of sunset and sunrise as important phases of biting activity by different species occur before or after these events.

When subsequently summing up several series of 24-hour catches the geometric mean is the most satisfactory value of the average frequency of mosquitoes in each of the hourly periods.

The work has revealed that there is, generally, a group of mosquitoes (representing several genera) which exhibits a short period of biting activity just before or after sunset; in a few species, a similar second peak is appreciable near dawn. These species often occur chiefly at a particular level and most breed in small containers like rot-holes, crab-holes, or domestic utensils. A second group consists of mosquito species with a prolonged period of activity—diurnal or nocturnal—and the biting cycle tends to be less regular. On the whole, they breed in swamps, ground pools, or river courses. Although mosquito species have usually shown consistent behaviour patterns of this kind, it is also known now that the time of peak activity may sometimes differ appreciably under different conditions. Environmental or more subtle factors may be responsible. Seasonal shifts in behaviour pattern are not marked. There are reasons in general for recommending that the 24-hour biting cycle should be investigated in any new area of study, rather than assume that the pattern will necessarily be the same as that established elsewhere. It has also become increasingly clear that arboreal species are influenced by vegetation rather than by height in their vertical zonation. A species, like *Aëdes africanus*, which is arboreal in continuous forest is, in more open discontinuous forest, at lower levels in daytime and migrates to the forest canopy as night approaches.

The view that a mosquito is actively conditioned to bite by a suitable combination of temperature and humidity in the microclimate has been abandoned by the author as inadequate. Some emphasis is now given to changes in light intensity, possibly of carbon dioxide tension and distribution in the vegetation, as activating factors at sunset and sunrise. Recent work indicates a close relationship between biting activity and ovarian development in forest culicines. A particularly interesting problem is raised by the fact that in some species a brief initial peak of activity may precede the period of more sustained activity. The author is not satisfied that a different period of biting activity for mosquitoes differing in age is wholly adequate as

an explanation although it is a view with much to commend it [this *Bulletin*, 1952, v. 49, 502].

In brief comments on other topics it is noted that some diurnal species appear to be stimulated to attack by seeing the host. Many other species seem to arrive on the host in successive waves at intervals of 5–15 minutes; the cause is not known. *D. S. Bertram*

Senevet, G. & Andarelli, L. Le genre *Culex* en Afrique du Nord. III.—Les adultes. [**The Genus Culex in North Africa. III. Adults**] *Arch. Inst. Pasteur d'Algérie.* 1954, Mar., v. 32, No. 1, 36–70, 7 figs. [18 refs.]

Two parts of this monograph on North African species of *Culex* have already appeared [this *Bulletin*, 1947, v. 44, (1020); 1949, v. 46, 876]; the first concerned the larvae, the second the male genitalia; this third part is a systematic study of the external morphological characters of males and females of 16 species. Full descriptions are given, many of them re-written, and a key for identification is provided.

Some additions to the previous lists have been found necessary and corrections to the keys will be published later. In this paper the authors take no part in the controversy on the *Culex pipiens* complex but admit *C. pipiens*, *C. pipiens* var. *berbericus*, and *C. molestus*, ignoring intermediate forms but including *C. fatigans* for completeness and comparison. *H. S. Leeson*

McNeel, T. E. & Ferguson, F. F. **Mosquito Distribution and Abundance in the Arkansas-White-Red River Basins.** *Pub. Health Rep.* Wash. 1954, Apr., v. 69, No. 4, 385–90. [Numerous refs.]

In the basins of the Arkansas, White and Red Rivers in the U.S.A. malaria is a notable potential problem while that of encephalitis is seasonally recurrent. The great majority of the mosquitoes in this area are biting pests and severely affect man and animals; of special importance is *Culex tarsalis*, the principal vector of encephalitis.

This paper is occupied mainly by a table showing the distribution, density and relationship to man and animals of 100 species of mosquitoes known to occur in the area concerned. Those species recorded as related to disease transmission are:—*Anopheles quadrimaculatus*, *A. albimanus* and *A. freeborni* which are proved vectors of malaria: *Aëdes aegypti* the vector of yellow fever and of dengue; *Aëdes aegypti*, *Aëdes dorsalis*, *Culex pipiens*, *C. stigmatosoma*, *C. tarsalis*, *Culiseta inornata*, *Culiseta melanura*, and *Mansonia perturbans* can transmit encephalitis.

The literature from which the information has been derived is listed by States. The area in question embraces the States of Arkansas, Colorado, Kansas, Louisiana, Missouri, New Mexico, Oklahoma and Texas. *H. S. Leeson*

Oka, H. **Mosquitoes of Yamaguchi Prefecture. I. The Results of the Survey in Onoda and Ozuki.** Reprinted from *Bull. Yamaguchi Med. School.* 1953, v. 1, No. 2, 79–85, 5 figs.

This first account of the mosquitoes of the Yamaguchi Prefecture, Japan, is based on evening collections of adults made at Onoda city and at Ozuki-chô. Shimonoseki city between June and September 1952 and small numbers of specimens received from other sources.

The most prevalent species were *Culex pipiens* var. *pallens*, *C. tritaeniorhynchus* and *Anopheles hyrcanus* var. *sinensis*. *Armigeres obturbans* was the next most prevalent mosquito and 10 other culicine species were taken but these were very few in number.

The incidence of Japanese B encephalitis in Onoda was studied and compared with the occurrence of *Culex tritaeniorhynchus* but because of the rarity of the disease in 1952 no conclusions were reached. All data are given in tables, on graphs and on a map. *H. S. Leeson*

Leví-Castillo, R. Aparición de una resistencia a los insecticidas de acción remanente en *Culex pipiens quinquefasciatus* de la ciudad de Guayaquil. [**The Appearance of Resistance to Residual Insecticides in** *Culex pipiens quinquefasciatus* [*fatigans*] **in the City of Guayaquil**] *Rev. Ecuatoriana de Entom. y Parasit.* Guayaquil. 1953, Oct., v. 1, No. 4, 7–16. [10 refs.]

Observations of resistance to DDT by *Culex pipiens quinquefasciatus* [*fatigans*] prompted a series of laboratory tests on colonies derived from adults collected from the region of Guayaquil, Ecuador. Two colonies were built up, the first, GSU, from adults collected in the town centre and the second, GSS, from adults collected from a suburb.

Experiments were carried out in small wooden cages into each of which was introduced a thick paper impregnated with the test insecticide. This was left for 1 hour, after which the mosquitoes were transferred to clean cages and observed for 48 hours. For each experiment, 10 males and 10 females were used, eggs were obtained from the survivors, and colonies selected for resistance were obtained in this way.

The experiments were carried out during 3 years, at the end of which new wild-caught mosquitoes were introduced to observe the results of crossing with the established resistant races.

In the first series of experiments 6 successive generations of GSU and GSS mosquitoes were exposed to residues from 5 per cent. DDT in kerosene. An increase in resistance was indicated by a rise from approximately 50 per cent. survival in the first generation to complete survival in the sixth generation.

The sixth generation of the DDT-resistant mosquitoes was then exposed to BHC, wettable powder and emulsion. The first results showed a high mortality but complete survival was established two generations later.

The mosquitoes resistant to DDT and BHC were further exposed to 2 per cent. chlordane which caused some mortality in the first generation exposed, but none in the second generation reared from survivors.

In the next series of experiments females, resistant to DDT, BHC and chlordane, were crossed with wild-caught males and the offspring exposed to a residue of DDT emulsion. Results showed complete resistance in both colonies. Wild-caught females were crossed with resistant males with the same result. *Anne Hudson*

Foote, R. H. & Pratt, H. D. **The Culicoides of the Eastern United States (Diptera, Heleidae).** A Review. *Pub. Health Service Publication No. 296. Pub. Health Monograph No. 18.* Wash. 1954, Feb., pp. iv + 53, 126 figs. on 11 pls. [Numerous refs.]

For those concerned with midges in the Eastern United States this is undoubtedly a useful work in a convenient form. It provides keys to females and to male terminalia, followed by descriptions of the species

illustrated by numerous figures of wings, thoracic markings, spermathecae, palps and male genitalia. The series of 34 species includes the following new species: *Culicoides denningi*, *C. horneae*, *C. stilobezzioides* and *C. wirthi*. The specific descriptions are followed by distribution records and the earliest and latest dates on which the midges have been collected. There is an introductory section on the importance of species of *Culicoides* as pests and as vectors of disease. This latter subject concerns also places other than the United States of America for which there is no evidence of the transmission of a pathogenic organism although the importance of some species as biting pests is very real. Other general sections consider the literature available on the adult taxonomy of the group as a whole, their biology, the seasonal incidence of American species, and control measures which have been tried in America and elsewhere. The systematic part of the paper is preceded by a consideration of the anatomy of the adults and methods of examining them in taxonomic work.

It seems unfortunate that this paper could not include at least references to some of the recent work on midges and their larvae in West Africa [this *Bulletin*, 1953, v. 50, 748, 1069] and in Scotland [*ibid.*, 1950, v. 47, 408; *Bulletin of Hygiene*, 1947, v. 22, 132; 1948, v. 23, 623]. Although, clearly, much of this would not be appropriate to a work on American species there is a good deal of new information on techniques of field study and on larval taxonomy which would be invaluable to workers anywhere.

D. S. Bertram

Labrecque, G. C. & Goulding, R. L. **Tests with Granulated BHC and Dieldrin for Controlling Sand Fly Larvae.** *Mosquito News.* 1954, Mar., v. 14, No. 1, 20–22.

Penetration of the densely foliated marshes bordering the Florida Intracoastal Waterway presented a major problem in trying to control the salt-marsh "sand-fly", *Culicoides furens*, by aerial or ground spraying of insecticides. However, a similar problem for the control of salt-marsh mosquitoes was overcome by applying granulated insecticides [this *Bulletin*, 1954, v. 51, 994], and it was thought that this method might be suitable also. The following experiment was done in January 1952.

An area of 325 acres infested with *Culicoides* larvae was treated by aeroplane with bentonite granules impregnated with BHC to give an average rate of 2 lb./acre of the *gamma* isomer. A month later, a 24-acre plot was treated with an oil spray of BHC and adjusted to give the same dosage of the *gamma* isomer. Another 8-acre plot was treated with 5 per cent. of dieldrin on bentonite granules at a rate of 1·25 lb./acre. An 80-acre plot of untreated area was kept as a check. The degree of larval control was based on the differences in counts, before and at various intervals after treatment, in soil samples taken from selected stations in each plot. Adult control was determined, only in the plot treated with granulated BHC and the check plot, by means of light traps and animal traps.

Results are given in a table which shows that granulated BHC gave nearly a complete control for a period of 12 weeks after which the number began to increase. In oil spray, it gave a 77 per cent. reduction for 2 weeks after which no reduction was noticed. Reduction with granulated dieldrin ranged from 94 to 99 per cent. for 24 weeks when counts were stopped. Adult control, as observed from the traps, was immediately noticed after treatment and the numbers remained at a low level for 2 months.

G. R. Shidrawi

Hocking, B. & Pickering, L. R. **Observations on the Bionomics of some Northern Species of Simuliidae (Diptera).** *Canadian J. Zool.* 1954, Apr., v. 32, No. 2, 99–119, 1 fig. [17 refs.]

The material for this study of the black flies (Simuliidae) of Churchill, Manitoba, Canada, was obtained during 1951–52 about 12 miles south of Churchill. The total number of species known to occur in the area is now 21 and after presenting some observations on the bionomics, especially of *Simulium venustum*, the authors give an account of their attempts to rear this species in the laboratory. Other methods are described by which individual specimens of 4 species, *Prosimulium gibsoni* and *decemarticulatum*, *Eusimulium furculatum* and *S. venustum* were reared in the field from half-grown larvae to adults: but no species was reared throughout its life cycle. All these attempts were made, not primarily to maintain a culture, but rather in order to obtain an understanding of the needs of the Simuliidae in nature.

The arrival of the larvae at their attachment sites appears to be brought about by mechanical action provided by a steep velocity gradient and once they are attached such a gradient is well suited to their respiratory and nutritional requirements. The spacing of the larvae is thought to be due to voluntary shifting after attachment thus minimizing competition for the available food.

Though many cultures were started and many adults were raised from the later larval stages none was reared from eggs. In nature, females of many species apparently lay eggs without a blood meal but in the laboratory no eggs were deposited and all attempts to induce laboratory bred flies to feed on blood failed.

Thus the difficulties encountered in the laboratory rearing of *S. venustum* which still remain to be overcome are the successful moulting of the first-instar larvae and the mating, blood-feeding and oviposition of the adults. The remainder of the life cycle can be completed with low mortality and little special equipment. *H. S. Leeson*

Lewis, D. J. & Kirk, R. **Notes on the Phlebotominae of the Anglo-Egyptian Sudan.** *Ann. Trop. Med. & Parasit.* 1954, Mar., v. 48, No. 1, 33–45, 9 figs. & 1 map. [17 refs.]

This paper brings up to date our knowledge of the distribution of the sandflies in the Anglo-Egyptian Sudan. Since the publication in 1952 of maps of distribution [this *Bulletin*, 1953, v. 50, 465] new localities for many of the species have been found and the additional records are shown on new maps. There are 36 species and 13 varieties now known to occur in the Sudan as well as a new species herein described and named as *Phlebotomus darlingi*. It is considered that the new species belongs to the subgenous *Spelaeomyia* which is redefined.

Animal burrows and cracks in the ground are important environments of sandflies and the "fissure environment" has been much studied [this *Bulletin*, 1951, v. 48, 534; 1952, v. 49, 555]. Sandflies will venture out only at night for they would not survive long in daytime conditions of high temperature and low humidity. In more humid areas in the south earth cracks are not in evidence and the flies have to be sought in animal burrows, tree holes and so on.

Phlebotomus fever is occasionally reported in the north where *P. papatasi* is abundant. Cutaneous leishmaniasis occurs in riverine areas of Upper

Egypt and of the Sudan north of Khartoum where *P. papatasi* may be considered to be the vector. The oriental sore type occurs in Darfur where *P. papatasi* is common and cases also occur in the Nuba Mountains, the Blue Nile and other districts within the kala azar endemic areas. *P. orientalis* is the only species of the *major* group in the north of which the distribution corresponds with that of kala azar but *P. lesleyae* and *P. rodhaini* are also found in more than one kala azar area. *P. clydei* is commonly taken from animal burrows and occasionally it bites man viciously and in large numbers; it may play some part in the transmission of leishmaniasis though it is outside the subgenus *Phlebotomus* but experimental evidence seems to show that it is probably a poor vector. More work is needed on this point.

Notes are given on collections made in different districts and a table shows the species collected at different localities between Sennar and Wadi Halfa on the Blue Nile and the main Nile. *H. S. Leeson*

Vargas, L. & Díaz Nájera, A. Lista de flebotomos mexicanos y su distribución geográfica (Diptera: Psychodidae). [**List of Mexican Species of** *Phlebotomus* **and their Geographical Distribution**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 309–14.

The English summary appended to the paper is as follows:—

"There are twenty nine Mexican species of *Phlebotomus* recorded up to now. Most of them were identified first out of Mexico. Most of them are from the Neotropical Region and some have a very large geographical distribution."

Ascher, K. R. S., Levinson, Z. H., Silverman, P. H. & Tahori, A. S. **Chemicals affecting the Preimaginal Stages of the Housefly. II. The Perchloroparaffins.** *Riv. di Parassit.* Rome. 1954, Jan., v. 15, No. 1, 45–55. [32 refs.]

Ascher, K. R. S. & Levinson, Z. H. **Chemicals affecting the Preimaginal Stages of the Housefly. III. Contact Toxicity for Third Stage Larvae of some Chlorinated Hydrocarbons deposited on Adsorbent Surfaces.** *Ibid.*, 57–61.

[Part I of this series was a review of the literature on the subject. See this *Bulletin*, 1954, v. 51, 653.]

Three perchloroparaffins (C_2Cl_6, C_3Cl_8, C_4Cl_{10}) were prepared and tested for insecticidal action against eggs, larvae and pupae of *Musca vicina*, in comparison with more complex chlorinated hydrocarbon insecticides. In the first study, comparisons of the 3 new compounds showed that hexachloroethane was least effective; neither this compound nor DDT was satisfactory against immature stages of *Musca*. The other 2 compounds were highly active and as good or better than *gamma* BHC. Octachloropropane was most effective in vapour form and decachlorobutane most effective when mixed with larval breeding medium (at 500 p.p.m.). Both compounds were 100 per cent. ovicidal at 1,000 p.p.m. whereas *gamma* BHC allowed 50 per cent. emergence at this rate.

The compound decachlorobutane was further tested in the second study by impregnated filter paper tests on the resistant 3rd stage maggots in

comparison with DDT, chlordane, dieldrin and *gamma* BHC. In 2 series of tests in which larvae were enclosed on deposits of 1 and 0·5 gm./sq.m. for 48 hours, only *gamma* BHC and decachlorobutane produced effective mortalities.

[These laboratory tests show definite promise of the perchloroparaffins, but are somewhat biased in favour of them by tests involving the vapour phase, which is absent with DDT, dieldrin, etc. Field tests should follow.]

J. R. Busvine

Dicke, R. J. **Fly Control on Dairy Farms. Resistance to Insecticides Less Important as Fly Control Factor than Poor Sanitation.** *Soap.* New York. 1954, May, v. 30, No. 5, 177–9, 183.

In the summer of 1953, 29 dairy farms were observed in 3 areas of Wisconsin in an effort to estimate the degree of house-fly control and the primary cause of control failures. Dairy barns, yards and all sheds housing animals were examined at monthly intervals from June to September for active fly breeding.

The resistance of flies to methoxychlor and lindane was determined on all farms where the fly populations were sufficiently large for samples of 50 or more flies to be collected. There appeared to be no correlation between the degree of fly control obtained and resistance to methoxychlor, but a definite correlation was evident between the conditions of sanitation and the degree of control obtained. It was found in these areas that frequent removal of refuse from the farmyards was more effective in fly control than repeated applications of residual or space spray insecticides. *Anne Hudson*

Smith, C. N. & Eddy, G. W. **Techniques for rearing and Handling Body Lice, Oriental Rat Fleas, and Cat Fleas.** *Bull. World Health Organization.* Geneva. 1954, v. 10, No. 1, 127–37, 6 figs.

At Orlando, Florida, U.S.A., the authors maintain colonies of lice *Pediculus humanus humanus* [*P.h. corporis*], and fleas *Xenopsylla cheopis* and *Ctenocephalides felis.*

After quoting Culpepper's method of feeding lice on man [this *Bulletin*, 1945, v. 42, 594] the authors describe a method of maintaining louse colonies on rabbits. The lice are kept at 30°C. and 60 per cent. relative humidity [RH] on pieces of black or blue suiting 4 cm. square. To feed the lice the patches are placed on the clipped belly of a rabbit held in a special stanchion. One rabbit can take 16–20 patches each bearing 100–200 lice; several lots can be fed in succession and one feed a day is sufficient. Each rabbit is used once in 4 days.

When lice are being collected from clothing they should be put on to small pieces of cloth and kept at 32–34°C. and 75 per cent. RH. The lice should be fed 2 or 3 times daily and every other day the patches containing eggs should be forwarded to the laboratory.

Adult *Xenopsylla cheopis* are fed on a white rat and the larvae are provided with sand and dried blood. The infested rat is put into a small cage, standing on a tray in a pan containing the larval medium. The floor of the tray is covered with blotting paper renewed twice weekly. The rat is fed on apple and dog-food and is disinfested and replaced after 3 weeks. The temperature is maintained at 27°C. and the relative humidity at 90 per cent.

The fleas lay their eggs on the sand which is periodically screened to

remove the cocoons. These are put into a wire basket suspended in a large bottomless pickle jar standing mouth downwards on the mouth of a smaller collecting jar which receives the emerging fleas.

As for *Ctenocephalides felis*, these fleas are allowed to infest a dog which is caged overnight. Part of the cage floor is of mesh through which the flea eggs drop on to a tray. The eggs are removed to rearing pans and kept at 27°C. and 80 per cent. RH; cocoons are periodically removed and treated like *Xenopsylla*.

In collecting fixed numbers of fleas, a funnel, attached to a length of transparent, flexible, plastic tubing, is placed over the mouth of the flea-collecting jar. The fleas are shaken into the tubing, isolated between 2 clamps, counted and then dropped into the testing chamber.

The paper is illustrated with photographs of the various pieces of apparatus but the legends for figures 3 and 4 need to be transposed.

[The method of dealing with cultures of *X. cheopis* seems more clumsy than that described by the reviewer, this *Bulletin*, 1932, v. 29, 488.]

H. S. Leeson

Sautet, J., Nicoli, R. M. & Tabau, R. Résistance et pseudo-résistance aux insecticides chlorés de souches locales de *Pediculus humanus humanus* Lin. (Anoplura) dans le Midi de la France. [**Resistance and Pseudo-Resistance of Local Strains of *Pediculus humanus* to Chlorinated Insecticides in Mediterranean France**] *Bull. Acad. Nat. Méd.* 1954, v. 138, Nos. 16, 17 & 18, 245–6.

After vain searches at Marseilles, a DDT-resistant strain of lice was found at Toulon. In laboratory tests at 15°C., these resistant lice all survived doses of DDT that killed 90 per cent. of the susceptible strain in 24 hours and 100 per cent. in 48 hours.

This true resistance is to be distinguished from pseudo-resistance at low temperatures. In tests below 10°C., the lethal action of DDT and, to some extent of BHC, was retarded, so that even susceptible lice appeared to be somewhat resistant.

J. R. Busvine

Vargas, L. Clave para identificar las familias, subfamilias y géneros de pulgas de México. [**Key for Identification of Families, Subfamilies and Genera of Mexican Fleas**] *Rev. Inst. Salubridad y Enfermedades Trop.* Mexico. 1953, Dec., v. 13, No. 4, 315–20.

The English summary appended to the paper is as follows:—

"The author presents keys for identification of both sexes of fleas that fall in 6 families, 10 subfamilies and 40 genera up to now reported from Mexico."

Rageau, J. Note complémentaire sur les Ixodidae du Cameroun. [**Further Note on Ixodid Ticks of the French Cameroons**] *Bull. Soc. Path. Exot.* 1953, v. 46, No. 6, 1090–98. [26 refs.]

In a preceding publication [this *Bulletin*, 1952, v. 49, 453], the author gave a list of 25 species of Ixodidae recorded from the French Cameroons. Since then, 10 more have been collected, thus bringing the total to 35 species belonging to 9 genera. These are 11 species of *Rhipicephalus*, 8 of

Amblyomma, 3 of *Aponomma*, 3 of *Hyalomma*, 3 of *Haemaphysalis*, 2 of *Boophilus*, 1 of *Dermacentor*, 3 of *Ixodes* and 1 of *Argas*. The present paper contains brief notes and host data of 24 of these species. Although the author made extensive searches for *Ornithodorus* ticks during the course of investigations into relapsing fever attributed to *Spirochaeta* (*Borrelia*) *duttoni*, he could not find these ticks in the Cameroons.

At least 12 species of ticks listed in the paper are of veterinary importance; they are *Amblyomma variegatum*, *A. splendidum*, *Boophilus decoloratus*, *B. congolensis*, *Rhipicephalus sanguineus*, *R. simus senegalensis*, *R. capensis longus*, *R. evertsi*, *Haemaphysalis leachi*, *H. parmata*, *Hyalomma transiens*, and *H. impressum*. Larvae of *Amblyomma variegatum* and very rarely larvae and adults of *Rhipicephalus sanguineus*, *Haemaphysalis leachi* and *Boophilus decoloratus* have been observed feeding on man. *Rhipicephalus planus complanatus*, *R. capensis longus*, *Ixodes rasus* and *I. schillingsi*, even though they have not been recorded as biting man, have nevertheless been collected from him.

M. G. R. Varma

Heisch, R. B. *Ornithodoros erraticus* **(Lucas) in Ant-Chat Burrows.** *East African Med. J.* 1954, June, v. 31, No. 6, 264.

The author first found *Ornithodorus erraticus* in the burrows of pygmy gerbils (*Dipodillus*) in the Lake Naivasha region of Kenya in 1950 [this *Bulletin*, 1951, v. 48, 157]. He now reports evidence of these ticks in the burrows of the ant-chat (*Myrmicocichla*) near Naivasha: these burrows penetrate several feet into the upper parts of earthy banks in eroded country. Ticks were found in 4 of 12 such burrows: larval, nymphal and adult stages were present. It is not known how the ticks became established, but it is suggested that they may have been transported by birds. The ticks were indistinguishable morphologically from those found in burrows of pygmy gerbils. No spirochaetes could be found in ticks examined. It was clear that *O. erraticus* has at least two distinct habitats in the Naivasha District. *H. J. O'D. Burke-Gaffney*

de Coster, P. Essais de séro-diagnostic en vue de reconnaître les porteurs de nymphes de porocéphales. [**Trials of Serological Tests for detecting the Presence of Pentastome Nymphs in Carriers**] *Ann. Soc. Belge de Méd. Trop.* 1953, Dec. 31, v. 33, No. 6, 563–8.

The presence of Linguatulidae in the body of men and animals is usually discovered only during autopsy and it is only very occasionally that one comes across the nymphs of these parasites in the mesenteries during herniotomy. De Coster and Rodhain [see this *Bulletin*, 1951, v. 48, 1050] found nymphs of *Armillifer armillatus* in two cysts in the conjunctiva of an African boy and this prompted the author to undertake the present study. The purpose was to discover whether the presence of these parasites in the body could be revealed by serological tests.

When an aqueous extract of the adult parasites was injected intravenously into rabbits, antibodies were formed which were capable of fixing complement in the presence of specific antigen; however, the fact that similar antibodies did not appear in the blood of parasitized rats and rabbits, the author says, needs further experimental proof. The intradermal injection of aqueous extracts of adult porocephalus into parasitized rats and rabbits was not followed by any marked reaction; on the contrary, in

sensitized but non-parasitized rabbits it produced a positive reaction. No precipitins were detected in the sera of infected animals or in that of an infected African child. *M. G. R. Varma*

Lalonde, D. I. V. & Brown, A. W. A. **The Effect of Insecticides on the Action Potentials of Insect Nerve.** *Canadian J. Zool.* 1954, Apr., v. 32, No. 2, 74–81, 3 figs. on 3 pls.

The cathode-ray oscillograph has made possible the study of the action of insecticides on nerve transmission of sensory impulses. The first insecticide studied was DDT by Welsh and Gordon (*J. Cell. Comp. Physiol.*, 1947, v. 30, 147) and Roeder and Weiant (*ibid.*, 1948, v. 32, 175), who found out that its characteristic effect on the nervous system of *Periplaneta americana* is the replacement of a single impulse by a train of multiple impulses recurring at a frequency of 200–500/sec. In the present work 17 insecticides, including DDT, were studied by applying corn oil solutions of the insecticides at the rate of 30μgm. to the metathoracic leg of the roach and determining the effect on the sensory impulses of the crural nerve by means of a preamplifier and the cathode-ray oscillograph. Adult males of the American cockroach only were used and were taken between 1 week and 2 months after their final moult. A full description of the way of preparation and dissection is given: only the potentials emanating from the metathoracic leg were recorded. The results are given in oscillograph figures each of which was based on the recordings of 3–6 preparations treated by the insecticide in question. An oscillograph trace from an untreated crural nerve preparation was taken as a control.

As shown in the figures, DDT, methoxychlor and DDD induced well-marked trains of repetitive discharge, and aldrin and dieldrin evoked low-voltage trains of repetitive discharge after a latent period of 2–4 hours. The effect of lindane was more rapid but consisted of tiny sets of repeat spikes. Technical chlordane, heptachlor, α-chlordane, β-chlordane and toxaphene all showed considerable latent periods ranging from 3–8 hours before stimulating the action potentials. The dinitro compounds DNOC and 3-4-dinitro-6-cyclohexylphenol (DNCHP) increased both voltage and frequency very soon after application, whereas the pyrethrins increased only the frequency which was, however, lower than the frequency of the two dinitro compounds. Of the organic phosphates, TEPP showed a transient effect on the activity of the nerve, parathion had a latent effect 2 hours after application, and schradan had no effect whatsoever during the 4 hours of observation period.

In discussion, the authors point out that their experiments had shown that: (1) DDT, methoxychlor and DDD bear generic similarities in their action upon the nerve and were quite different in effect from lindane which is much simpler in structure; (2) aldrin and dieldrin induce trains of repetitive discharge lower in frequency and voltage than DDT, and are slower in effect; (3) the chlorinated terpenes, such as the chlordane compounds, are characterized by a latent period before exerting any effect on nervous transmission; (4) the dual effect of the dinitro compounds and the flexion of the leg thus induced could possibly explain their known rapid action, and indicate that it involves nervous tissue. The authors then conclude that all insecticides tested, with the exception of schradan, exert an effect on the insect nerve; some insecticides may exert their effect on the sensory cells and others on the nerve itself, but it was impossible to distinguish between these two modes of action by the method used. *G. R. Shidrawi*

Yeomans, A. H. & van Leeuwen, E. R. **Insecticide Spray Deposits. How much Insecticide remains on a Wall Surface after Application of the Spray from an Atomizing Nozzle?** Some Basic Factors influencing Spray are Studied. *Soap.* New York. 1954, Apr., v. 30, No. 4, 141–3, 3 figs.

When walls are sprayed with residual insecticides, only a proportion of the spray liquid is retained on the surface. It is desirable to reduce the loss as far as possible, both for economy and efficiency and because floating mists of insecticide may involve a toxic hazard to the operator.

Experiments were undertaken with 3 different spray nozzles to determine the proportion of liquid retained on a vertical metal surface sprayed from different distances. The curves relating percentage deposit to spraying distance differ considerably for the 3 nozzles and vary according to whether oil or water is the liquid sprayed. From the curves it is possible to estimate the most efficient spraying distance, thus:

		Nozzle		
		A	*B*	*C*
Optimum Spraying Distance	Water	4 in.	20 in.	24 in.
	Oil	4 in.	12 in.	16 in.
Mass Mean Diameter (Oil Spray)	(microns)	100	140	180

As a rough approximation, it can be said that finer sprays should be applied from a shorter distance. But many factors are involved; for example, the air stream generated by the spray itself, and moving about the same speed as the particles, tends to carry away fine particles when it is deflected by the wall. Large particles may " splatter " if the nozzle is too near, or fall to the ground if it is too remote.

Where large spray programmes are contemplated the type of nozzle chosen should be tested, in the manner described, to determine its optimum spraying distance. *J. R. Busvine*

World Health Organization: Expert Committee on Insecticides. **Insecticides. Manual of Specifications for Insecticides and for Spraying and Dusting Apparatus.** Addenda and Corrigenda. First Issue—May 1954. [11 loose-leaf pp.] 1954. Geneva: W.H.O., Palais des Nations.

This is the first of the additions and amendments referred to in the abstract of the original *Manual* [this *Bulletin*, 1954, v. 51, 120]. It contains (1) notes on specifications, methods of determination, and tests for suspensibility of dieldrin water-dispersible powder concentrates, (2) amplification and interpretation of empirical tests relating to DDT, BHC and dieldrin emulsion concentrates, (3) four minor corrections of previous insertions, and (4) a page setting out the structure and functions of WHO and of its expert advisory panels and expert committees. *H. J. O'D. Burke-Gaffney*

LABORATORY PROCEDURES

Schilling, V. Anleitung zur Diagnose im dicken Bluttropfen. Für Ärzte und Studierende. [**Introduction to the Diagnosis in Thick Blood Films: for Physicians and Students**] 6th Edition. pp. viii + 66, 14 text figs. & 6 coloured figs. on 2 pls. (1 folding). 1951. Jena: Gustav Fischer. [DM. 4.80.]

This booklet, written by a leading German haematologist, is intended to serve as a practical guide to the technique and application of the thick blood film method in the diagnosis of blood-inhabiting parasites and various disorders manifested in the appearances presented by the formed constituents of the blood.

First, a detailed description is given of the technique, starting with the collection of the blood sample, preparation of the film, and its staining. The only stain mentioned is Giemsa's modification of Romanowsky's method. An account is then given of the appearance of various forms of leucocytes, and of those elements of the red cells (normoblasts, Heinz-bodies, "*Erythrokonten*", etc.) which are unaffected by haemolysis, both under normal and pathological conditions. These structures are illustrated by photomicrographs and their clinical significance is explained. Finally, a description is given of the following blood parasites as seen in thick films: malaria parasites of the three common species, relapsing fever spirochaetes, trypanosomes, *Bartonella* and microfilariae.

The protozoa and other parasites in thick films are depicted in 6 coloured figures, which—though on a small scale—are clear enough for diagnostic purposes.

As stated in the preface, anyone who learns the technique described in this booklet should be able to produce good preparations, in which the various elements will be found without much difficulty. *C. A. Hoare*

MISCELLANEOUS PAPERS

American J. Trop. Med. & Hyg. 1954, May, v. 3, No. 3, 412–33. **Symposium: Global Interest in Tropical Medicine. Economic Interest in Tropical Medicine** [May, S.]. 412–21. **Cultural Aspects of Tropical Medicine** [May, J. M.]. 422–30, 1 fig. **Political Implications of Global Tropical Medicine** [Corrigan, F. P.]. 431–3.

i. In this address an American economist gives his views on tropical medicine, and he arrives at the conclusion that the geographer's definition of the tropics and subtropics, the economist's demarcation of the underdeveloped areas, and the territories in which mass diseases provide the major medical problem, all connote the same geographical zone. Tropical medicine is concerned primarily with the prevention and treatment of mass diseases, few of which are specifically tropical and some of which were common in western countries within the last 100 years. Indeed, many of the diseases now prevalent in industrialized countries may at some future date be regarded as tropical diseases when their incidence has been controlled in western countries but not in those less developed. For example, the important diseases of the economically advanced areas may in some cases be the result of industrialization, but in others they may be very old diseases

which are masked in the under-developed areas. Cancer, heart disease and diabetes cannot have comparable clinical importance in areas where life expectancy is reduced below half that in western countries.

Tropical medicine would seem to be the medicine of poverty areas and it therefore calls for preponderant emphasis on preventive measures. The relative cost of preventive and curative measures has some correspondence with relative abilities to pay for what is the greatest need in the respective areas. Fortunately, programmes for the effective control of mass disease in under-developed areas can be financed for about one-tenth of the cost of the combined preventive-curative services in industrialized areas, which corresponds to the difference in average income.

The United States of America has a great interest in promoting tropical medicine because of its large consumption of the world's primary materials. If the dynamism of the United States' economy is sustained this proportion will be increased in the future. Similarly, an expanding export market must be maintained. The continued rise in living standards in western Europe and the United States is dependent on a correlative development of the less advanced areas in which economic progress will only follow the control of mass disease.

ii. In the second address a geographer, who was previously a French colonial surgeon, discusses epidemiology. The epidemiological mechanism which is responsible for the observed pathological facts in any area is revealed by an analysis of the environmental factors and a study of the cultural traits which these have fostered. Culture is defined as the sum total of the traits and techniques that man acquires and develops in the process of becoming adapted to his environment, and it is important to consider how adaptation contributes to the production of tropical diseases. The author illustrates his thesis by a review of the history and present condition of the people of Viet Nam and of the physical environments to which they adapted themselves.

The original immigrants lived in the mountains for safety but arable soil was scanty and hunger drove the majority down to the hills and still later to the rich agricultural land of the plains. Here rice grew abundantly but the population increased far above the density the land could reasonably carry. Moats are built round the compact lowland villages, the water in which is used for bathing, laundry, fish culture and water-cress culture. Houses in the hills are built of timber but in the lowlands of mud and straw-thatch. Rice, preferably polished, is the staple food and it is fertilized with human and animal faeces. Fish, snails, cray-fish and crabs form part of the daily diet. In most cases the average consumption of food does not exceed 1,800 calories and is low in animal protein.

The people of the delta have acquired a culture which enables them to survive and in the process of adaptation situations have been created which have a direct bearing on the disease pattern, frequently by promoting or destroying the effectiveness of a vector or of an intermediate host. The situation can be summed up thus: from the waters the people get their food, also their cholera, dysenteries, typhoid fever and malaria; from the food they get their protein deficiencies and beriberi; from the earth they get their hookworm; from the crowded villages their tuberculosis and yaws, and from their housing their plague and typhus.

In every country the physical environment of the water, earth, wind and temperature varies and the people are forced to adapt themselves to it. These factors shape the pattern of disease and an understanding of them is necessary for purposes of control.

iii. According to the third speaker, political factors and developments have both negative and positive effects on the pattern of preventible disease

throughout the world. Health budgets are reduced in favour of military expenditure; local epidemics are concealed from the people for fear of political repercussions, until their spread compels public recognition. Such negative political obstruction occurs in all countries. On the positive side progress in world health work was going on well until disturbed by the second world war when human life and health were subordinated to other considerations. In 1948 the World Health Organization came into being officially and in the same year cholera in Egypt was responsible for the first world mobilization against disease. The organizations associated with WHO also have important health influences and it is hoped that through these combined efforts integrated global planning for the health and well-being of the peoples of the world will progress rapidly. No other accomplishment can do so much for the cause of peace, and interference with this development by a third world war might destroy civilization. *T. H. Davey*

REPORTS AND SURVEYS

East Africa High Commission. **East African Medical Survey Departmental Annual Report, No. 5, 1953** [Laurie, W., Director]. 16 pp., 2 figs. on 2 pls. 1954. Nairobi: Govt. Printer.

It has been decided that the proper method of publication of the results of surveys is by the production of a monograph for each area surveyed, and that annual reports should be limited to brief statements of work done during the year. The present report recapitulates the objectives of the survey, its administrative problems and methods of work in a manner similar to that recently reviewed [this *Bulletin*, 1954, v. 51, 858]. It also gives a brief statement of the surveys which have been carried out which does not differ greatly from that previously produced.

[The strength of the report is that it describes a mechanism of survey which would give an analysis of the vital statistics of rural areas and of the state of health and parasitization of inhabitants and the causes of their illnesses. The weakness lies in the statement that "due to shortage of statistical staff and machinery, data is [*sic*] accumulating at a faster rate than it can be handled and so far it has not been possible to issue a monograph on any one area". The making of surveys itself demands a development of technique, but if this can be carried out and data can be collected and analysed in a satisfactory manner considerable light should be thrown on the state of health of rural populations. The business of a survey is, however, to some extent to arrange a balance between collection and analysis, and the former may justifiably be slowed down if it is necessary to facilitate the latter. Without proper analysis and presentation no sound judgment of the value of the surveys can be given.] *G. Macdonald*

Bull. Méd. de L'Afrique Occidentale Française. 1954, Jan., Special Number, 60 pp., 24 pls. (9 coloured folding). [Bibliography.] Taches et problèmes de la Santé publique en A.O.F. Le Service d'Hygiène Mobile et son oeuvre [Sanner, L. & Masseguin, A.]. [**Public Health Tasks and Problems in French West Africa. The Mobile Health Service and its Work**]

This interesting monograph gives a comprehensive description of the organization of public health activity in French West Africa, as it exists

today, and the story of its evolution from the days when greater emphasis was placed on providing medical relief for the sick and suffering in these vast territories than on prevention of disease. Today public health efforts are concentrated on the control or eradication of the chief scourges that afflict the people, trypanosomiasis, leprosy, malaria, treponema infections, eye diseases, etc. The change of emphasis has paid rich dividends.

In 1939 an independent Sleeping Sickness Service was created which was subsequently transformed into the existing Mobile Health and Prevention Service. This Service enjoys almost complete autonomy. Its headquarters are at Bobo-Dioulasso (Upper Volta) in the Ivory Coast, and its sphere of activity is coextensive with the whole of French West Africa. There are 5 special sections, trypanosomiasis, leprosy, malaria, treponema infections, and eye diseases, but the activities of the Service are not restricted to these diseases. There are also biological, chemical and entomological laboratories, a school for the training of auxiliary technical personnel, and all the necessary equipment, stores and administrative offices. The work of the various sections is described in detail.

Graphs and maps illustrate the progress that has been made in the fight against sleeping sickness and leprosy. Other maps indicate the distribution of the sectors of the Service's activities throughout French West Africa and the distribution of onchocerciasis based on the results of the examination of nearly three million persons. There are also numerous photographic reproductions illustrating many phases of the work. *Norman White*

See also p. 1042, Tanganyika. Medical Department. **Sleeping Sickness Service Annual Report 1953.**

BOOK REVIEWS

Wigglesworth, V. B. [C.B.E., M.D., F.R.S.]. **The Principles of Insect Physiology.** 5th Edition, with addenda. pp. viii + 546, 355 figs. 1953. London: Methuen & Co. Ltd. New York: E. P. Dutton & Co. Inc. [42s.]

When the first edition of this book appeared in 1939, [see this *Bulletin*, 1939, v. 36, 703] it was stated that "to readers of this *Bulletin* the significance of this book is that nearly every problem in the control of insects makes an intelligent person look for information on their physiology". After 2 reprints a fully revised edition appeared in 1950 [*ibid.*, 1951, v. 48, 1058]. A further edition has now become necessary. The text of the 1950 edition has been substantially retained, but at the end of each chapter addenda and new references have been included. The additions amount to some 28 pages of text and 224 references. Progress is noted in many fields, particularly those concerning internal secretions and the control by hormones of processes in insect development. The addenda add to, but do not substantially out-date the 1950 edition, nevertheless field workers will find that they give a succinct account of recent research. This book has brought the results of physiological research to medical entomologists the world over in a way that can seldom have been equalled by any other publication, and by keeping it up to date the author continues to put those who have access only to a limited amount of literature further into his debt.

Kenneth Mellanby

Pessôa, Samuel Barnsley. **Parasitologia Médica.** [Medical Parasitology.] 4th Edition [Revised and Enlarged]. 1026 pp., numerous figs. 1954. Rio de Janeiro: Livraria Editora Guanabara Koogan S.A., Rua do Ouvidor, 132.

In his preface the author states that so much fresh knowledge on Medical Parasitology has accumulated since the 3rd edition was issued that careful revision has been needed to bring the subject up to date. This is, word for word, what he wrote in his preface to the previous edition in 1951, but he gives no indication of any particular changes, so that, in order to discover what these are, it has been necessary to compare the two, page by page, paragraph by paragraph, and often even line by line. The result of this is to demonstrate clearly that Professor Pessôa has been most careful, meticulously careful to keep himself *au courant* with new developments and to embody the results in his treatise.

It would not be possible in the space at our disposal to mention all these improvements; we can only indicate their general trend and speak of a few special points. A work of this character which calls for a fresh edition every 2 or 3 years is obviously very popular and in great demand—in other words fulfils its purpose.

Speaking first of the general setting up we should mention that the type has been changed in many places, *e.g.*, small italics instead of capitals for heads of sections and subsections; the lines are spaced more widely apart so that the letterpress is not so crowded and reading is facilitated; the number of lines in a page has been reduced by 4 or 5, so that the actual text is not increased by so much as the number of pages (885 in the 3rd, 1026 in the 4th editions) might lead one to infer. The revision has been very carefully carried out and the author must have read almost everything connected with his subject—vast and comprehensive though it is—in nearly every language; every page affords evidence of his selective acumen. Certain paragraphs have been omitted, many are changed in the wording, others have been inserted, others, again, re-written. The bibliography which occupied 18 pages now has 23 and the index, though reduced from 30 to 28 pages, contains many more entries on each page; text figures have been increased by 66 in actual numbers, but in reality by more than this because some of the old ones have been discarded. The illustrations are excellent and well reproduced; some have been a little reduced in size, others enlarged, but all show clearly the important details they are intended to depict. Some of the misprints of the 3rd edition have been corrected, but a considerable number still remain and a few more have been added. For example, Warrington Yorke is still deprived of his final " e " which, by way of compensation, has been given to Boyd. Tables have been brought up to date but, being given in slightly smaller print, are reduced in size and space is thus saved.

A work which has passed through several editions at short intervals does not call for detailed review of its general subject matter, but some of the newly introduced sections must be spoken of. A paragraph on Weinman and Klatchko's work on *Toxoplasma* toxin has been inserted (p. 30) and on p. 33 a note on hyaluronidase and the " spreading factor ". Fixation of complement was referred to in the 3rd edition, but in the present the general principle is described in a separate section (p. 40) and there is another insertion on heterophile antibodies. The author adduces evidence to justify his use of the generic term *Endamoeba*. Another new illustration is Fig. 25 (p. 78) of the large race of *E. histolytica*. The schema of the evolutionary cycle of this parasite is good and is new. Amoeboma receives mention, but in 6 lines only, as resembling ileocaecal tuberculosis or caecal neoplasm. In

addition to the text reference to the age incidence of *E. histolytica* infection a useful table has been inserted (p. 106). Another important and interesting inclusion is that of general introductory remarks on the treatment of *E. histolytica* infection (p. 115) and the use of antibiotics and chloroquine (aralen) (p. 120). The tabulated scheme of amoebae parasitic in man is new and good. Fig. 51 (43 in the 3rd edition) is now printed the right way up; the same applies to one or two others. The illustrations of 3 species of *Trichomonas*, Fig. 59 (p. 147) have been changed and enlarged and are now much clearer. The paragraph on the pathogenicity of *Trichomonas vaginalis* has been considerably amplified and the treatment section re-written. Figs. 81 and 82 (formerly 75 and 74) have been transposed and the legends reversed. There are 2 new illustrations of the liver in histoplasmosis (p. 211) and another of bone-marrow smear in kala azar. Fig. 103, illustrating the evolution of *Trypanosoma cruzi* in the gut of *Triatoma infestans* is new and a section has been added on the metabolism of *T. cruzi* (p. 226) and on the dangers of transmission of infection by blood transfusion (p. 230). In connexion with the same trypanosome are 4 new illustrations of experimental infection of the camondongo, and 2 new figures illustrating inoculation chagoma (pp. 236 and 237) have replaced the old one which was not very clear. Chapter XV, on *T. rangeli*, contains several fresh interpolations and illustrations. Fig. 123 of *Isospora hominis* is new and that formerly designated *Isospora hominis* is now *I. belli*. The whole section is largely re-written and *I. bigemina* Stiles of the cat and dog omitted, while there has been inserted a new table of the differential characters of *Isospora hominis* and *I. belli*.

Garnham's schematic representation of the evolution of plasmodia has been added and much of this section has been re-written or re-cast. On the treatment of malaria, on p. 284 of the 3rd edition is the statement that Deane and Sutter treated with Camoquin 121 patients in 1948, with 25 relapses of *P. vivax* infection and 1 of *P. falciparum*. In the present edition the date is left unchanged but the number treated is given as 522 and the relapses still as 25 and 1 respectively. If these are correct figures, there have been no relapses among the additional 401 treated—a fact certainly worth noting, if true [see this *Bulletin*, 1950, v. 47, 1058].

On p. 348 the more realistic figures of *Balantidium coli*, of Wenyon and Hoare, have been given the place of the schematic presentation of Craig and Faust. The description of *Toxoplasma* (p. 352) has been amplified and an illustration of the sickle shapes in experimentally infected camondongos is given and reference is made to Otten and Thalhammer's work with dogs and other domestic animals as reservoir hosts. A section on clinical diagnosis has also been added (p. 357) and one on the use of antibiotics in treatment, or, rather, of their failure except in the case of aureomycin in large doses.

In the Spirochaetosis chapter a fresh introduction is the treatment of syphilis with penicillin (p. 378) and the bony lesions of secondary yaws find place. In fact, the Yaws section has been largely re-written; it is much fuller, with more figures and there is an excellent table (XXVIII, pp. 392 and 393) of the characters of the lesions produced by the spirochaetes of syphilis, yaws and pinta, but there is no mention of bejel. In the present edition is an additional table differentiating several leptospires and noting the diseases they produce, the chief respective hosts and other animals found infected.

In the Schistosomiasis section there are many changes in the text with additional illustrations of *Schistosoma mansoni*, the common cause of schistosomiasis in Brazil, whereas *S. haematobium* and *S. japonicum* are

left as before and are disposed of in 14 and 18 lines respectively. In the Helminth chapters several new illustrations appear, *e.g.* of *Clonorchis sinensis*, *Paragonimus westermani*, *Fasciolopsis buski*, *Taenia solium*, the ovum of *Hymenolepis diminuta*, the female genitalia of nematodes (after Travassos), the buccal capsule and ova of *Syngamus laryngeus* and the mouth parts of *Ancylostoma duodenale*, *Necator americanus* and *A. caninum*. The chapter on the distribution of filariasis has been so revised as to constitute almost a re-writing and the same remark applies to the evolution of *W. bancrofti*; two new maps of the geographical distribution of bancroftian and other filariases in Brazil are now introduced and the text is brought up to date, with a table of the results of examination of nocturnal blood in 9 districts of Brazil. Further, the pathogeny section of filariasis has been re-written and there is a new table of the findings in hourly examinations of the blood of filarial patients in Belém. Other new insertions are maps of the geographical distribution of *Onchocerca* (p. 707), of *Mansonella ozzardi* (p. 709) and *Dipetalonema perstans* (p. 710). Fig. 372 (p. 715) is the same as the old 318, but reproduced upside down and right to left. Figs. 417 and 418 of *Triatoma infestans* correspond respectively to 360 and 359 of the previous edition, but the legends are left as before, so that the legends and figures do not now correspond. Other new figures include those of *Triatoma sordida* (421) and *Rhodnius* (422), tungiasis (436) and blastomycosis after extraction of *Tunga* (437). Another important insertion is the list of pathogenic bacteria which have been isolated from *Musca domestica*, with the authors' names and dates (p. 928).

In the concluding chapter on Laboratory Technique new features include artificial xenodiagnosis and the preparation of antigen for intradermal tests for schistosomiasis.

To sum up: the above review will suffice to indicate, by mentioning some of the changes, how thoroughly the author has tried to bring his book up to date and how well he has succeeded. The careful reader will find other points which lack of space precludes us from detailing. The bibliography and textual additions show that the author, as stated above, must have read nearly everything fresh that has been published and "held fast to that which is good". Already the book is becoming unwieldy as a single volume and if knowledge of Medical Parasitology continues to progress at the rate it has done in the past 2–3 years, the author might well consider issuing the work in two volumes. We conclude this review by offering Professor Pessôa heartiest congratulations on the accomplishment of a colossal undertaking and, on behalf of workers in tropical medicine, gratitude for this comprehensive volume. *H. Harold Scott*

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